

Department of Millinery

# WOMAN'S INSTITUTE of DOMESTIC ARTS & SCIENCES INC.



INSTRUCTION PAPER  
*With* EXAMINATION QUESTIONS

## SKELETON FOUNDATIONS

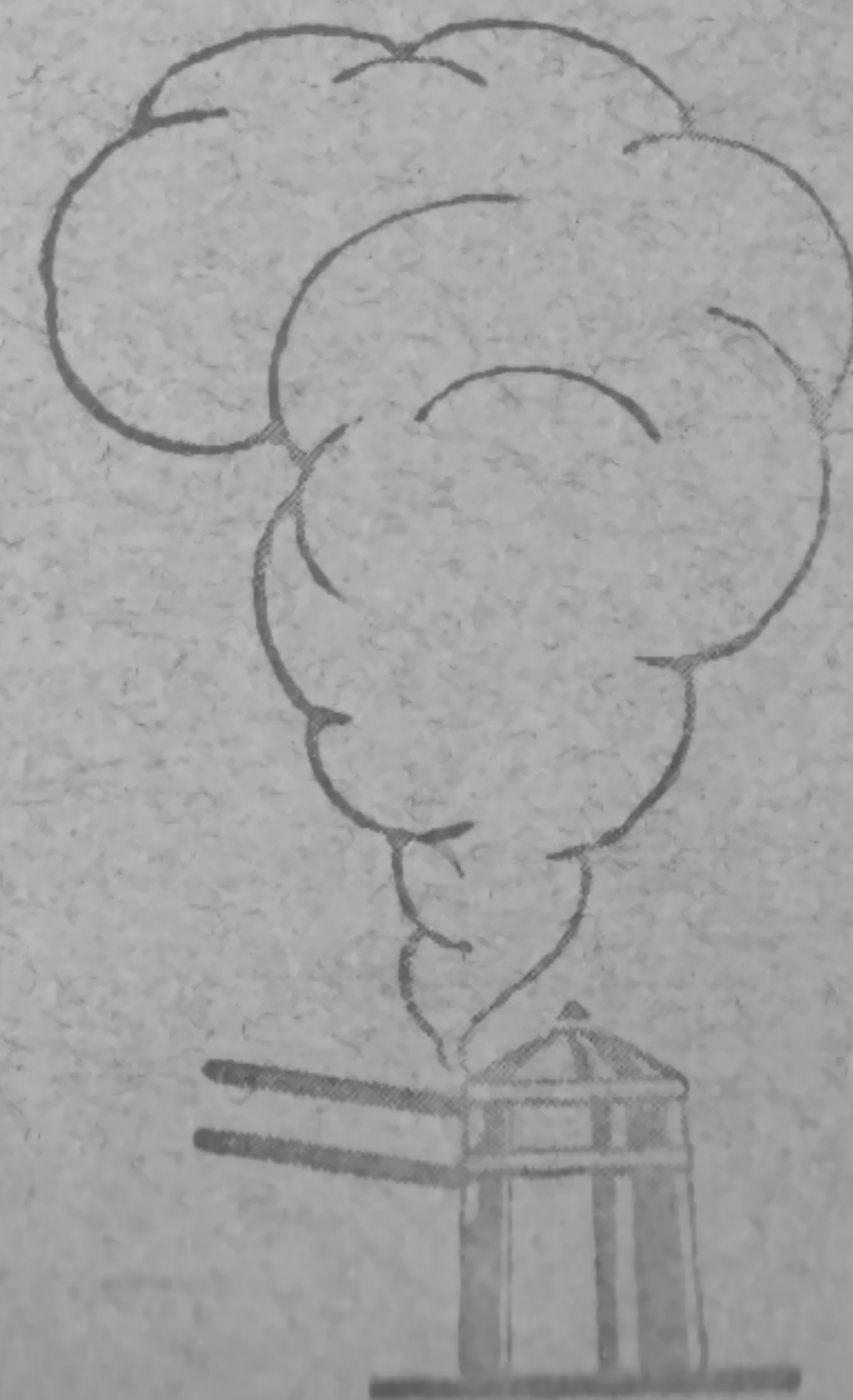
PART 2

By ORA CNE

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## ADVICE TO THE STUDENT

Study a few pages at a time and in consecutive order. Pay particular attention to the definitions; a correct understanding of them is essential. If you do not understand any of the statements or if you meet with difficulties of any kind, write to us for assistance. It is our desire to aid you in every way possible.

After you have studied the entire Section, review the whole subject, then write your answers to the Examination Questions at the end of this Paper. All that is necessary is to give the answers and write in front of each the number of the question to which it refers.

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# SKELETON FOUNDATIONS

(PART 2)

## WIRE FRAMES—(Continued)

### CONSTRUCTION OF WIRE BRIMS

#### EXPLANATION OF TERMS

1. Ordinarily, a skeleton foundation is of the two-piece type; that is, the usual wire frame consists of two parts, a crown and a brim, made separate and then combined by being fastened together. However, it is possible to make the crown and the brim in one piece, thus forming a one-piece frame, as will be shown later. Either wire or buckram may be used to construct a brim, but this Section will describe the construction of wire brims only. Wire brims may be made in a variety of shapes, and their widths may vary from 1 in. to 1 ft. or more, according to the dictates of fashion. The different forms of crowns that were described in the preceding Section can be used in combination with any of the various brims illustrated in this Section, thus giving a large number of two-piece frames of different styles.

2. The covered brim of a hat fulfils three important objects. It affords protection to the eyes from the glare of strong light; it serves as a support for certain kinds of trimmings; and it forms a frame for the face. In the construction of a wire brim, the first step is to measure the head-size and then to make the head-size wire to this measurement. The method of doing this is exactly the same as that used in making a head-size wire for a crown. The wire at the outer edge of a brim is called the **edge wire**, and the wires that



extend outwards from the head-size wire to the edge wire like the spokes of a wheel are known as support wires, just as in the construction of wire crowns. Wires that extend around the brim between the head-size wire and the edge wire, and are more or less nearly circular in form, are known as brace wires.

#### SAILOR BRIM

3. A very simple form of wire brim, known as the **sailor brim**, is shown in Fig. 1. Various lengths of head-size and edge wires and

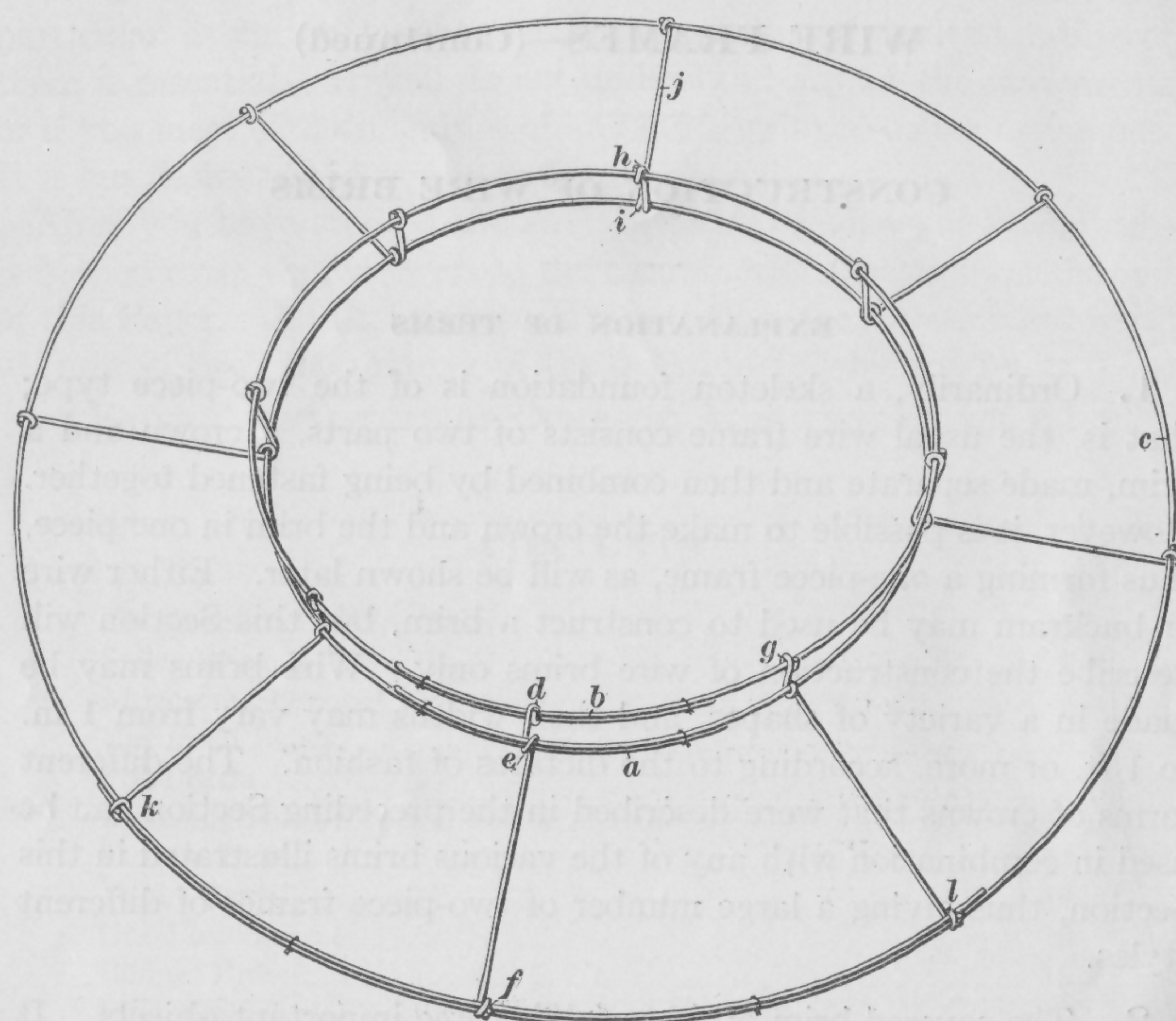


FIG. 1

widths of brim may be used, but in this particular instance the head-size is 24 in., the edge wire is 43 in. around, and the width of brim is 3 in. The first step is to make the head-size wire *a*, in the usual way, using No. 21 brace wire, as for crowns. The brace wire *b* is of the same size and is made in the same way. It is an absolutely necessary part of the sailor brim, since the rigidity of the construction depends on it. A brim consisting merely of a head-size wire

and an edge wire joined by straight support wires would have no stiffness whatever; but by placing the brace wire *b*  $\frac{1}{2}$  in. above the head-size wire *a* and joining them by support wires whose longer ends extend out to the edge wire *c*, a very rigid brim is produced. As there are eight support wires, the head-size wire *a*, the brace wire *b*, and the edge wire *c* are marked off into eight equal divisions. Paper gauges, made as previously explained, are used for this purpose.

4. The distance *d e*, Fig. 1, between the brace wire *b* and the head-size wire *a* is  $\frac{1}{2}$  in., and the width *e f* of the brim is 3 in. If 2 in. is allowed at each end for making the twists, the length of wire required for each support wire is  $2 + \frac{1}{2} + 3 + 2 = 7\frac{1}{2}$  in. Therefore, cut eight

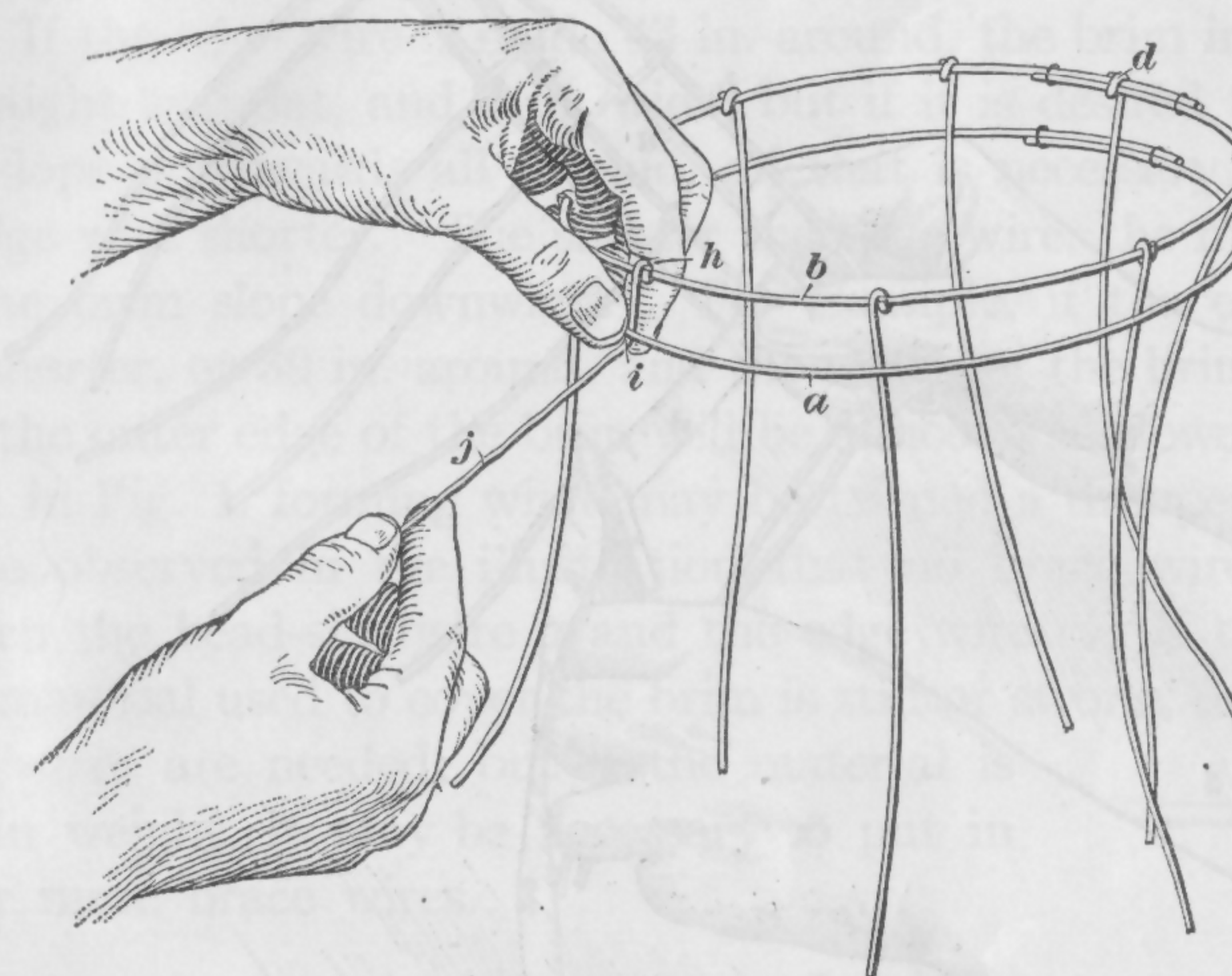


FIG. 2

pieces of brace wire, each  $7\frac{1}{2}$  in. long. Take up the brace wire *b* and twist the end of one of the  $7\frac{1}{2}$ -in. support wires around it at *d*; twist another support wire around it at the next division mark *g*; and continue around the brace wire *b* until the eight support wires are fastened to it at equal distances apart. Then cut off the ends of the support wires close to the brace wire *b* and press the twists firmly. The next stage in the construction is shown clearly in Fig. 2. Drop the ends of the support wires through *inside* the head-size wire *a*, taking care to have the overlapped ends of the wires *a* and *b* in line at the same end. On one of the support wires, as, for example, the one fastened at *h*, measure off a length *h i* of  $\frac{1}{2}$  in., and make a bend at *i*. Move the head-size wire into this bend, so that the proper



mark on the wire *a* is at the bend, and then twist the support wire *j* around the head-size wire at *i*, in the manner indicated. The end of the wire *j* will have to be passed through between the wires *a* and *b*; but it is flexible, and no difficulty will be experienced in making the twist. Then do the same with the remaining seven support wires, keeping the wires *a* and *b*  $\frac{1}{2}$  in. apart all around.

5. After the support wires have been twisted around the head-size wire at the eight equally spaced points, proceed as shown in Fig. 3. Take the tape measure and place one end against the head-

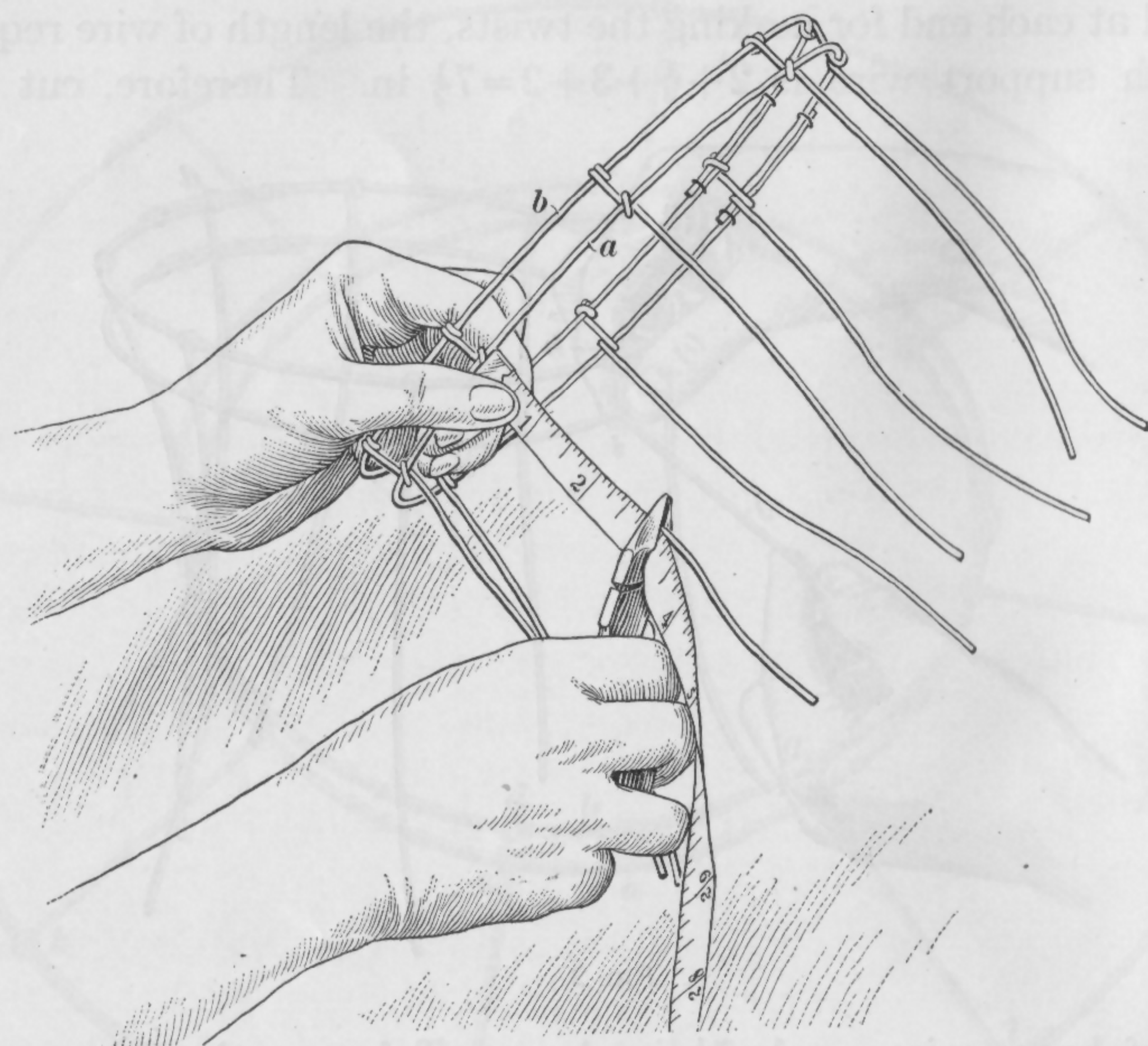


FIG. 3

size wire *a*, at the point where a support wire is fastened, and hold it there with the thumb and forefinger of one hand. Take the pliers in the other hand, open the jaws, let the tape measure and the support wire rest in the opening of the jaws, and move the pliers outwards along the support wire until the inner side of the pliers comes to the 3-in. mark on the tape. At this point close the jaws on the support wire and the tape and bend the end of the wire upwards, giving the pliers a slight twist. In the same manner, bend each of the other support wires upwards at a point 3 in. from the head-size wire. If desired, a paper gauge can be used instead of the tape

measure. Next, bend all of the support wires so that they stick straight out from the head-size wire as in Fig. 1, and set the 43-in. edge wire into the bends at their outer ends, taking care to have the mark *f*, at the middle of the overlapped ends, directly opposite the points *d* and *e*. Then twist the support wires around the edge wire at the eight marked points, cut off their ends, and press the twists firmly. To give stiffness, make the edge wire 55 in. long, so that it will have a 12-in. overlap. The overlapped wires will then extend across three support wires, as shown at *k*, *f*, and *l*. If the ends at *k* and *l* are found to be too long, they can be cut off after the brim is finished. The sailor brim may be made either circular or oval in shape. Five yards of wire will be sufficient to make this brim.

6. If the edge wire is made 43 in. around, the brim in Fig. 1 will be straight and flat, and 3 in. wide; but if it is desired to have the brim slope downwards all around, all that is necessary is to make the edge wire shorter. The shorter the edge wire, the more sharply will the brim slope downwards. For example, if the edge wire is 4 in. shorter, or 39 in. around, and the width of the brim is kept at 3 in., the outer edge of the brim will be almost 2 in. lower than that shown in Fig. 1, forming what may be termed a drooped brim. It will be observed in the illustration that no brace wires are used between the head-size wire *a* and the edge wire *c*. If the braid or other material used to cover the brim is stiff or strong, no additional brace wires are needed; but if the material is light in weight, it may be necessary to put in one or more brace wires.

7. **Shifting Position of Twist.**—In twisting a support wire to the head-size wire or to an edge wire it may happen that the twist will be made a little to one side of the correct point, so that the position of the twist will have to be changed. As an example, take the case shown in Fig. 4. The support wire *a* has been fastened to the brace wire *b* at *c* and has been twisted around the head-size wire *d* at a point *e* a little too far to the left. This twist, to be in its correct position, should be directly below the point *c*; so that the part *f* of the support wire will be square with both wires *b* and *d*. To shift the twist, the support wire does not have to be untwisted wholly from the head-size wire *d*. The end is

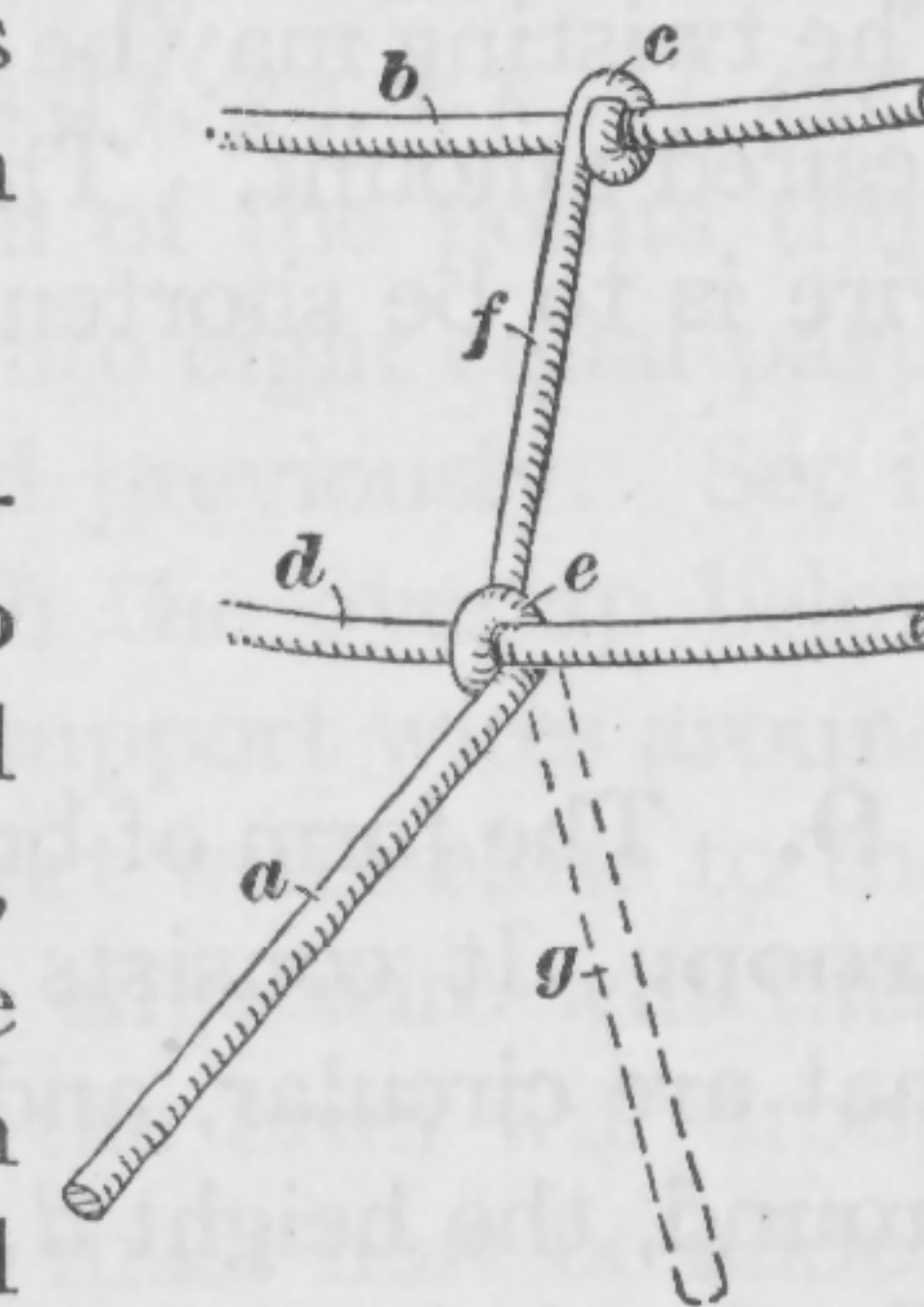


FIG. 4



simply pushed down and back to the position shown dotted at *g*. This loosens the twist at *e* to such an extent that the twist can be slid along the wire *d* to the correct point. The end of the support wire is then drawn up again, making a tight twist at the new point on the head-size wire.

**8. Method of Shortening a Wire.**—Another error that may very easily occur in making a frame is that of getting a support wire too long. This is illustrated in Fig. 5 (*a*), in which the support wire *a* has been twisted around the edge wire *b* at *c* and cut off, after which

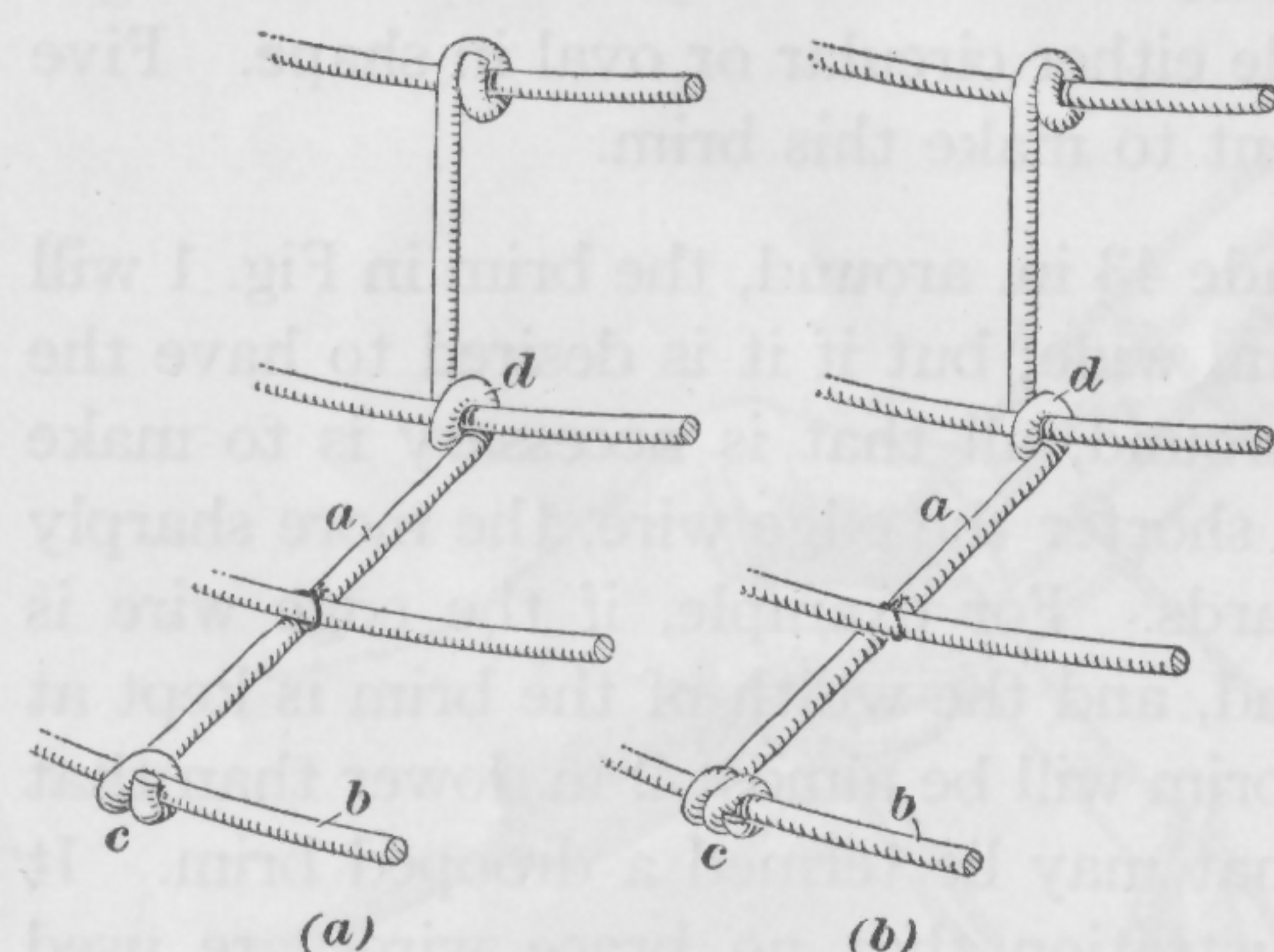


FIG. 5

it has been found that the distance *cd* is too great by perhaps  $\frac{1}{4}$  in. It is not necessary to untwist the wire at *c* and put in a new support wire in order to correct this fault. Simply grip the twist at *c* with the jaws of the pliers and turn the whole twist around the wire *b* until another full turn has been added, as shown in (*b*). It

will then be found that the distance from *c* to *d* has been shortened. The twisting may be continued until the wire has been shortened the desired amount. This method is to be used, of course, only when a wire is to be shortened a small fraction of an inch.

#### MUSHROOM DROOP

**9.** The form of brim illustrated in Fig. 6 is called the **mushroom droop**. It consists of a top brace wire *a* and a head-size wire *b* that are circular, and each 24 in. around. The edge wire *c* is 43 in. around, the height *de* is  $\frac{3}{4}$  in., and the width *df* of the brim is  $3\frac{3}{4}$  in. The head-size wire and the top brace wire are made in the usual manner. There are eight support wires, and if 2 in. is allowed at each end for twisting around the top brace wire and the edge wire, the length required for each will be  $2 + \frac{3}{4} + 3\frac{3}{4} + 2 = 8\frac{1}{2}$  in.; therefore, cut eight pieces of brace wire, each  $8\frac{1}{2}$  in. long. Mark off the top brace wire *a* into eight equal spaces and at these marks attach the

eight support wires, just as in starting the plain sailor brim, after which cut off the short ends of the support wires close to the wire *a*. Take a  $\frac{3}{4}$ -in. paper gauge, mark off  $\frac{3}{4}$  in. on each support wire, and make a bend at each point. Set the head-size wire *b* into these bends, and twist each support wire once around the head-size wire. Be very sure to have the overlapped ends of the head-size wire beneath the

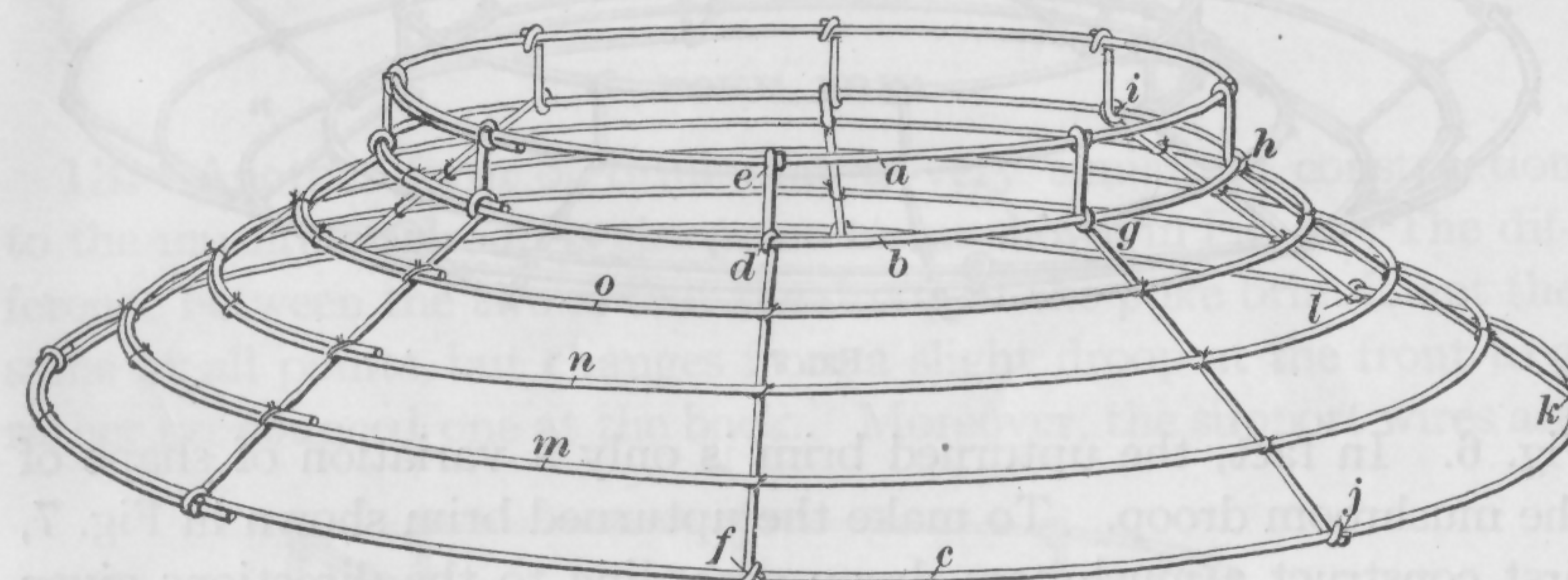


FIG. 6

overlap on the top brace wire, and see that the support wires are twisted around at the eight points *d, g, h, i*, etc., spaced equally on the head-size wire.

**10.** Now, as the brim is to be  $3\frac{3}{4}$  in. wide, cut a paper gauge of this size, or use the tape measure as illustrated in Fig. 3, and from the points *d, g, h, i*, etc., Fig. 6, mark off the lengths *df, gj, hk, il*, etc., on the support wires and make a bend at each of the points thus marked. Take the edge wire *c* and mark it off into eight equal parts by the use of a paper gauge made as described previously. Set it on the bent-up ends of the support wires, with the overlap below the overlap of the head-size wire, and twist the support wires around it at the points thus marked. Cut off the support wires close to the edge wire and press all the twists firmly. The edge wire will then be about  $2\frac{1}{4}$  in. below the head-size wire, and the brim will droop evenly all around. The brace wires *m, n*, and *o* must now be added to complete the construction of the brim and give it the necessary rigidity. These brace wires are fastened on top of the support wires, with the overlaps at the back. The method of attaching them is exactly the same as that used in attaching brace wires to the support wires of a crown. They are spaced an equal distance apart. Eight yards of brace wire will be found sufficient to make this brim.



## UPTURNED BRIMS

11. The form of **upturned brim** shown in Fig. 7 is made up of the same number and lengths of wires as the mushroom droop in

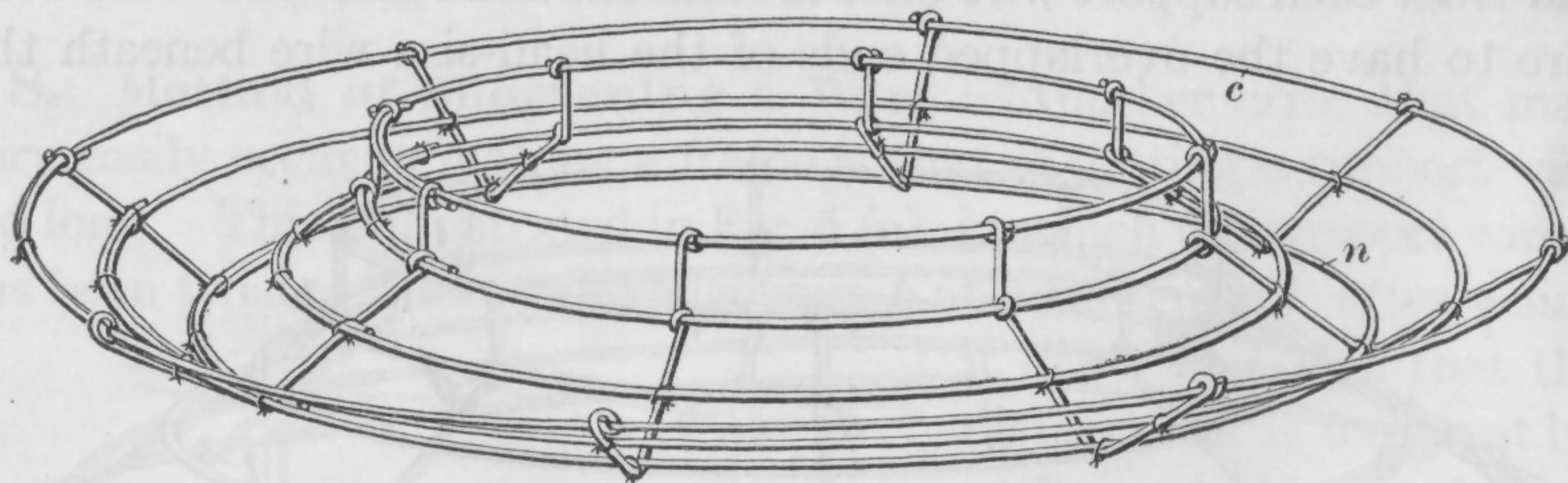


FIG. 7

Fig. 6. In fact, the upturned brim is only a variation of shape of the mushroom droop. To make the upturned brim shown in Fig. 7, first construct a mushroom droop according to the directions given in the preceding two articles. Then, at the points where the brace wire *n*, Fig. 6, is tied to the support wires, bend all the support wires upwards at the same angle, so that the edge wire will be at the same height all around. The result will be the upturned brim shown in Fig. 7. If the work is done accurately, the edge wire *c* will be just as far above the brace wire *n* as it was below that wire in Fig. 6.

12. Another variation of shape of the mushroom droop is shown in Fig. 8, in which one side only is turned up, the other side remain-

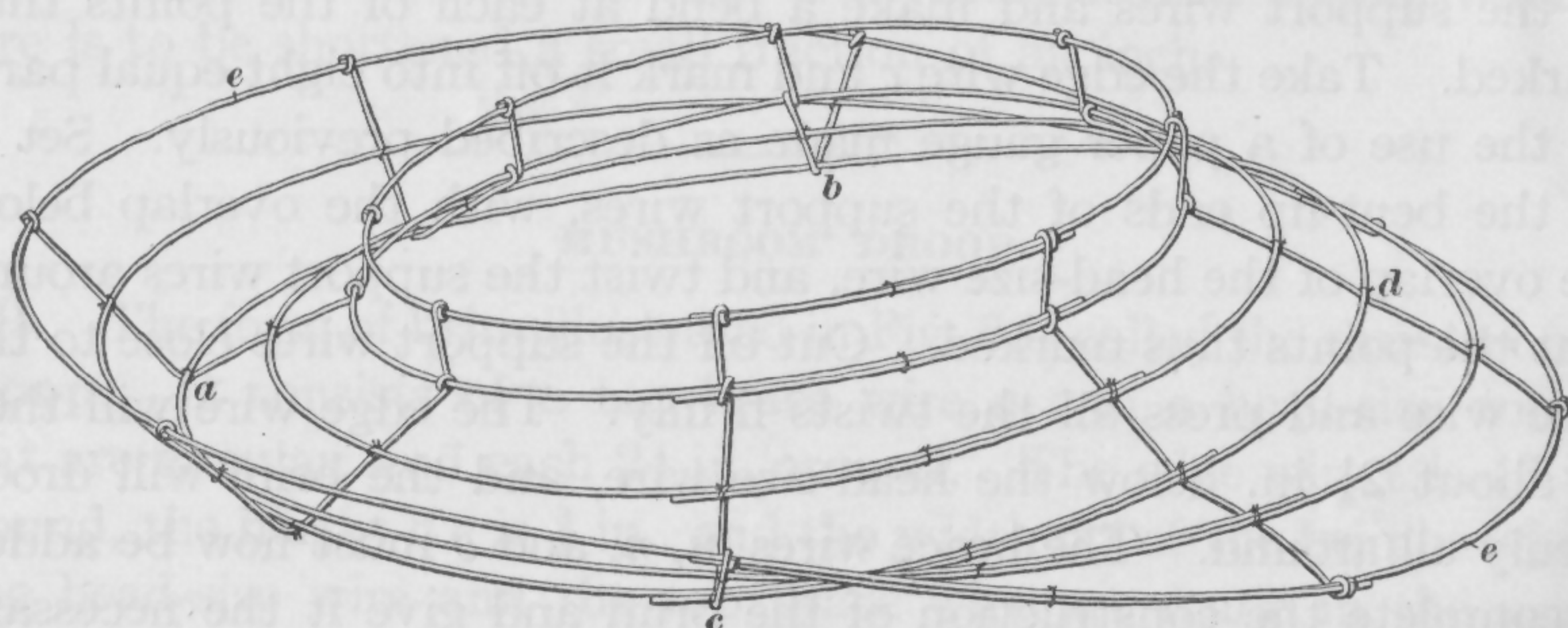


FIG. 8

ing as in the original droop. The brim is constructed according to the directions already given for making a mushroom droop, after which the support wires are bent to produce the shape shown in the illustration. It is to be noted that the support wires are not bent

to the same extent all around, but that the bend is greatest at the left side or at the point *a*. At the front *b* and the back *c* the bends are about the same, and at the right side *d* there is practically no bend in the support wire. The other four support wires are bent to such extent as to give the edge wire *e* a graceful, smooth droop from the upper edge at the left to the lowest point at the right side.

## POKE BRIM

13. Another form of brim that is very similar in construction to the mushroom droop is the **poke brim** shown in Fig. 9. The difference between the two is that the droop of the poke brim is not the same at all points, but changes from a slight droop at the front to a rather pronounced one at the back. Moreover, the support wires are

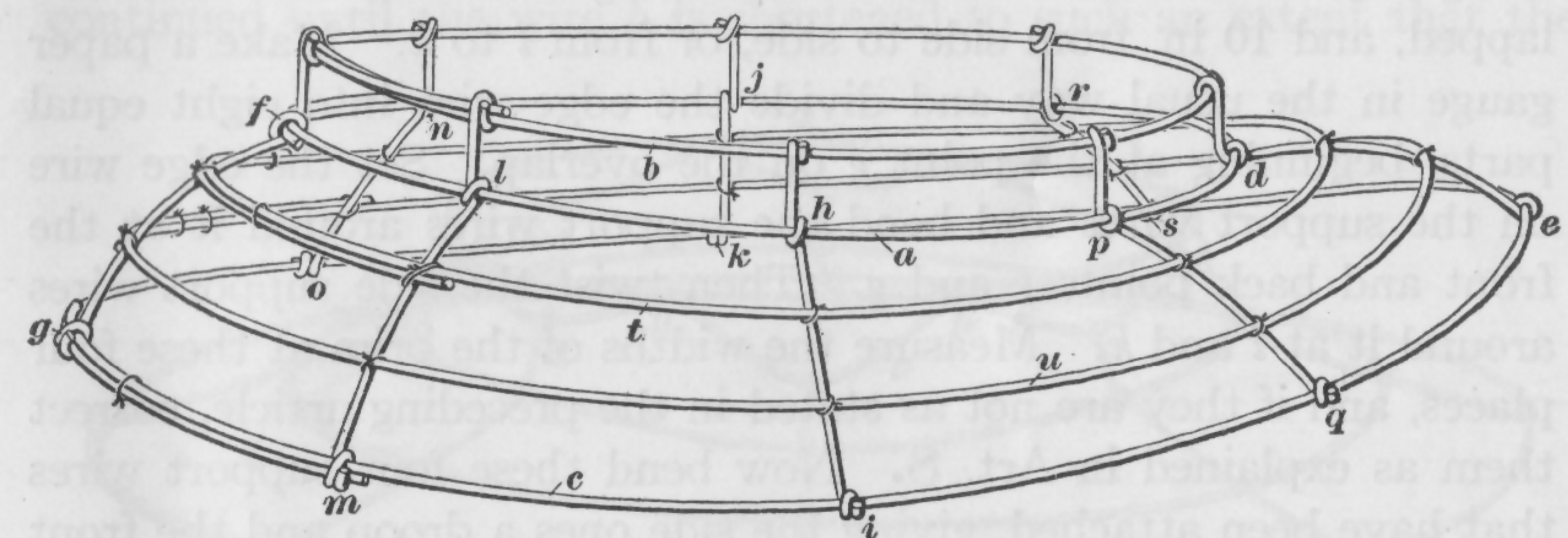


FIG. 9

not straight, but are curved to a greater or less extent. The poke brim shown has a head-size wire *a* that is 24 in. around, bent to an oval measuring  $8\frac{1}{2}$  in. from front to back and 7 in. from side to side. The top brace wire *b* is of the same size and shape. The edge wire *c* is oval, measuring  $12\frac{1}{2}$  in. from front to back and 10 in. from side to side. It is 35 in. around, and is curved more sharply at the front than at the back. The distance between the top brace wire and the head-size wire is  $\frac{3}{4}$  in. and the support wires vary in length from  $2\frac{1}{4}$  to  $2\frac{3}{4}$  in. The longer support wires are used at the front and back, and the shorter ones at the sides.

14. To make the poke brim, first construct the 24-in. head-size wire *a*, Fig. 9, and the top brace wire *b* just like it, and then stretch them to ovals  $8\frac{1}{2}$  in. by 7 in. Mark off each into eight equal parts and attach the eight support wires to the top brace wire *b* at these points.



The support wires may all be cut to the same length,  $7\frac{1}{2}$  in., which will allow ends sufficiently long to enable the support wires to be twisted around the top brace wire and the edge wire. On each support wire mark off a length of  $\frac{3}{4}$  in. from the top brace wire and at these points fasten the head-size wire by twisting each support wire once around the head-size wire. Now mark off the width of the brim at the various points. The lengths  $d e$  and  $f g$  are made  $2\frac{3}{4}$  in. each and the wires are bent up at  $e$  and  $g$ . The lengths  $h i$ ,  $j k$ ,  $l m$ , and  $n o$  are made  $2\frac{1}{2}$  in. each, and the wires are bent up at  $i$ ,  $k$ ,  $m$ , and  $o$ . The remaining support wires are bent so that the lengths  $p q$  and  $r s$  are  $2\frac{1}{4}$  in. each. The brim is then ready to have the edge wire attached.

15. Take the edge wire  $c$ , Fig. 9, and stretch it to an oval measuring  $12\frac{1}{2}$  in. from the front  $e$  to the back  $g$  where the ends are overlapped, and 10 in. from side to side, or from  $i$  to  $k$ . Make a paper gauge in the usual way and divide the edge wire into eight equal parts, beginning at the point  $g$  on the overlap. Set the edge wire on the support wires and bend the support wires around it at the front and back points  $e$  and  $g$ . Then twist the side support wires around it at  $i$  and  $k$ . Measure the widths of the brim at these four places, and if they are not as stated in the preceding article, correct them as explained in Art. 8. Now bend these four support wires that have been attached, giving the side ones a droop and the front and back ones the form shown in the illustration. Then attach the other four support wires at the marked points  $m$ ,  $o$ ,  $s$ , and  $q$ . Cut off the ends of the eight support wires close to the edge wire and press all twists down tight. Then give the corresponding support wires at the right and left sides the same bend, so that the two sides of the brim will be alike. Finally, add the two brace wires  $t$  and  $u$ , spacing them equally on the support wires, by making gauges and dividing the several wires into three equal parts, tying them with tie wires at the points thus marked. This brim can be made with 6 yd. of brace wire.

#### REDUCING HEAD-SIZE AND WIDTH OF BRIM

16. **Reducing Head-Size.**—When a frame is factory-made, instead of being especially designed for the wearer, it is apt to be too large in the head-size; consequently, some means must be adopted to reduce the head-size and make the frame of a size to fit the wearer.

A simple method of attaining this result is shown in Fig. 10. The illustration shows a brim whose head-size wire  $a$  and top brace wire  $b$  originally were of the same size and form, and both too large for the wearer. The wire  $b$  was directly above the wire  $a$  and the short ends  $c$ ,  $d$ ,  $e$ , etc., of the support wires stood straight up and down.

17. To reduce the head-size of the brim, bend the top brace wire  $b$ , Fig. 10, upwards at the points  $f$ ,  $g$ ,  $h$ ,  $i$ , etc., midway between the points where the support wires are fastened. The effect of these bends will be to shorten the wire  $b$  and at the same time to cause the short ends  $c$ ,  $d$ ,  $e$ , etc., of the support wires to slant inwards. The amount of bending at the points  $g$ ,  $h$ ,  $i$ , etc., depends on how much the wire is to be shortened; the greater the amount of shortening required, the more must the wire  $b$  be bent. The bending should be continued until the wire  $b$  is shortened to such an extent that the

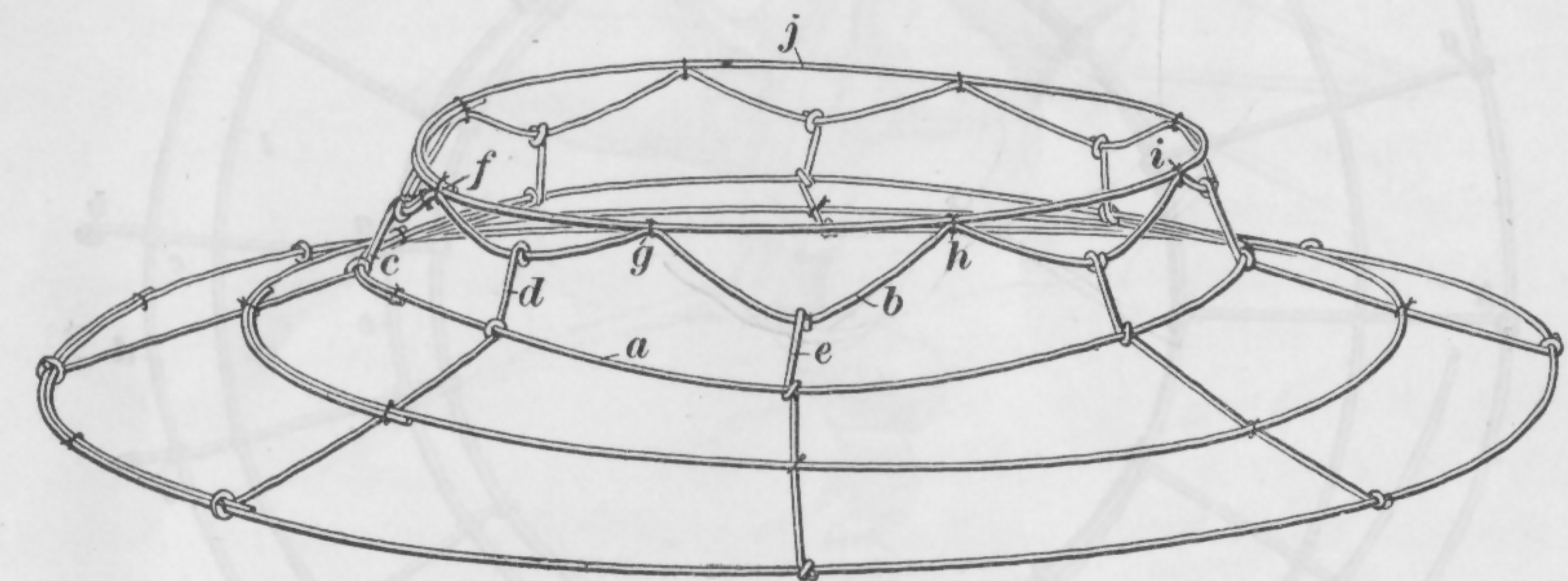


FIG. 10

brim will fit when tried on the head. Then a wire  $j$  should be tied to the brace wire  $b$  at the points  $f$ ,  $g$ ,  $h$ , etc., to prevent the bends at those points from straightening out and thus increasing the size of the opening. The overlapped ends of the wire  $j$  must be at the back of the brim.

18. **Reducing Width of Brim.**—If a brim of the desired width cannot be obtained readily, a wide brim may be purchased and the width may easily be reduced; or, if the style changes from wide to narrower brims, an old brim may be made narrower without much effort. A method of reducing the width of a wire brim is shown in Fig. 11. The original width of the brim is represented by the length  $a b$  of the support wire and the width to which the brim is to be reduced is the length  $a c$ . The method of doing this is simply



to loosen the edge wire *d* by opening the twists at the outer ends of the support wires and then to attach the edge wire to the support wires at the desired distance from the head-size wire *e*. To loosen the twist at the end of a support wire, take the pliers and grip the end of the twist firmly between the points of the jaws, as shown in Fig. 12. Then push downwards and forwards on the handles of the pliers, thus loosening the support wire from the edge wire. It is

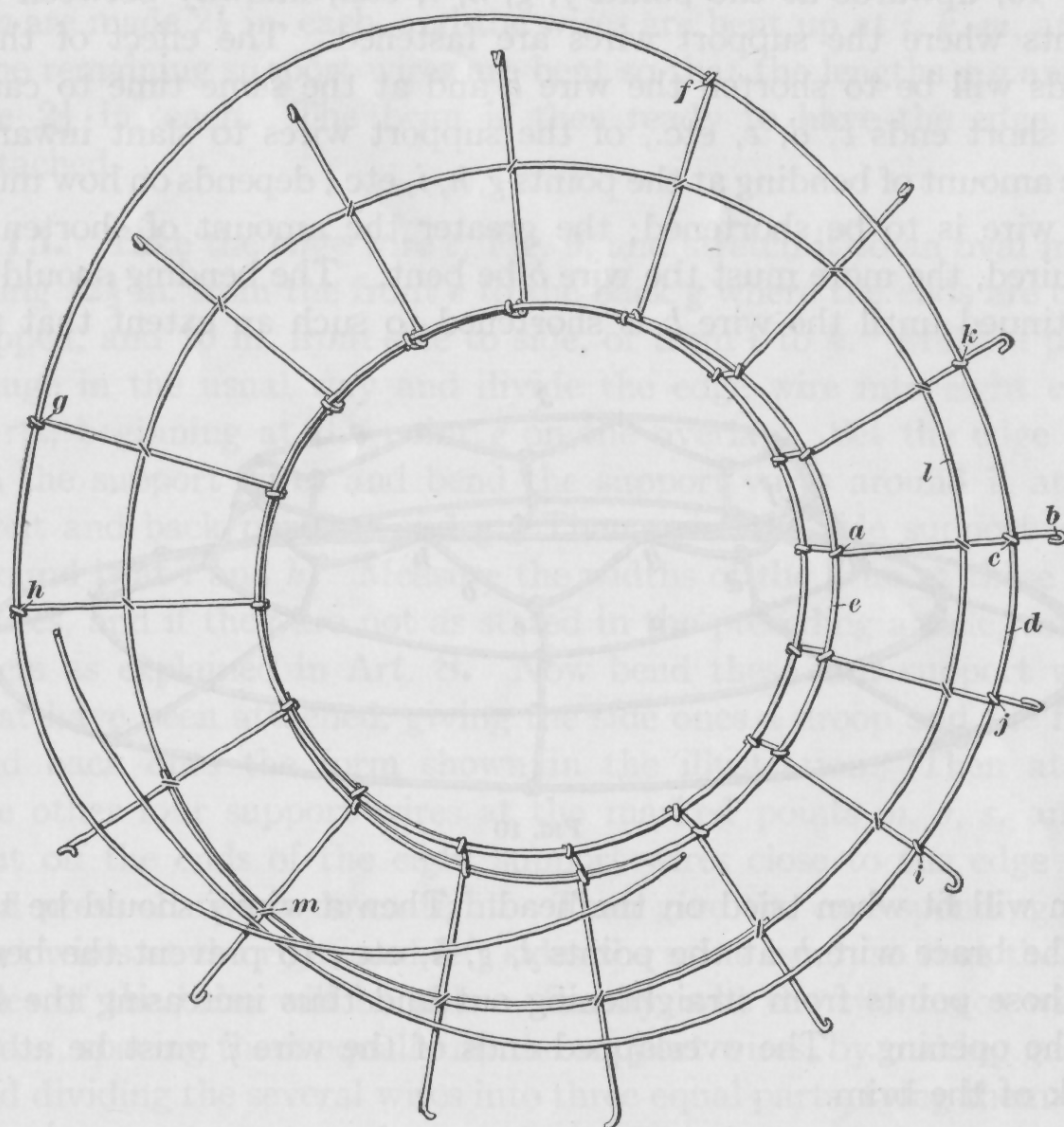


FIG. 11

not necessary to loosen all the support wires before beginning to refasten the edge wire; in fact, it will be found easier to allow the edge wire to remain fast at two or three places, as at *f*, *g*, and *h*, Fig. 11.

19. Cut a strip of paper of a length equal to *a c*, Fig. 11, to be used as a gauge, and from the head-size wire *e* mark off the points

*i*, *j*, *k*, etc., which are the points at which the edge wire is to be refastened to give the desired width of brim. Begin at some point, as *i*, and twist the support wire around the edge wire, then proceed to *j* and repeat the operation, and so continue around the brim, attaching the edge wire at the points marked on the support wires. When the point *k* is reached, it will probably be found necessary to loosen the twist at *f*, for the edge wire *d* will creep forwards as the refastening proceeds, because the edge wire of the smaller brim requires less wire than the edge circle of the original brim. It will not be necessary to space the support wires on the smaller edge wire during the refasten-

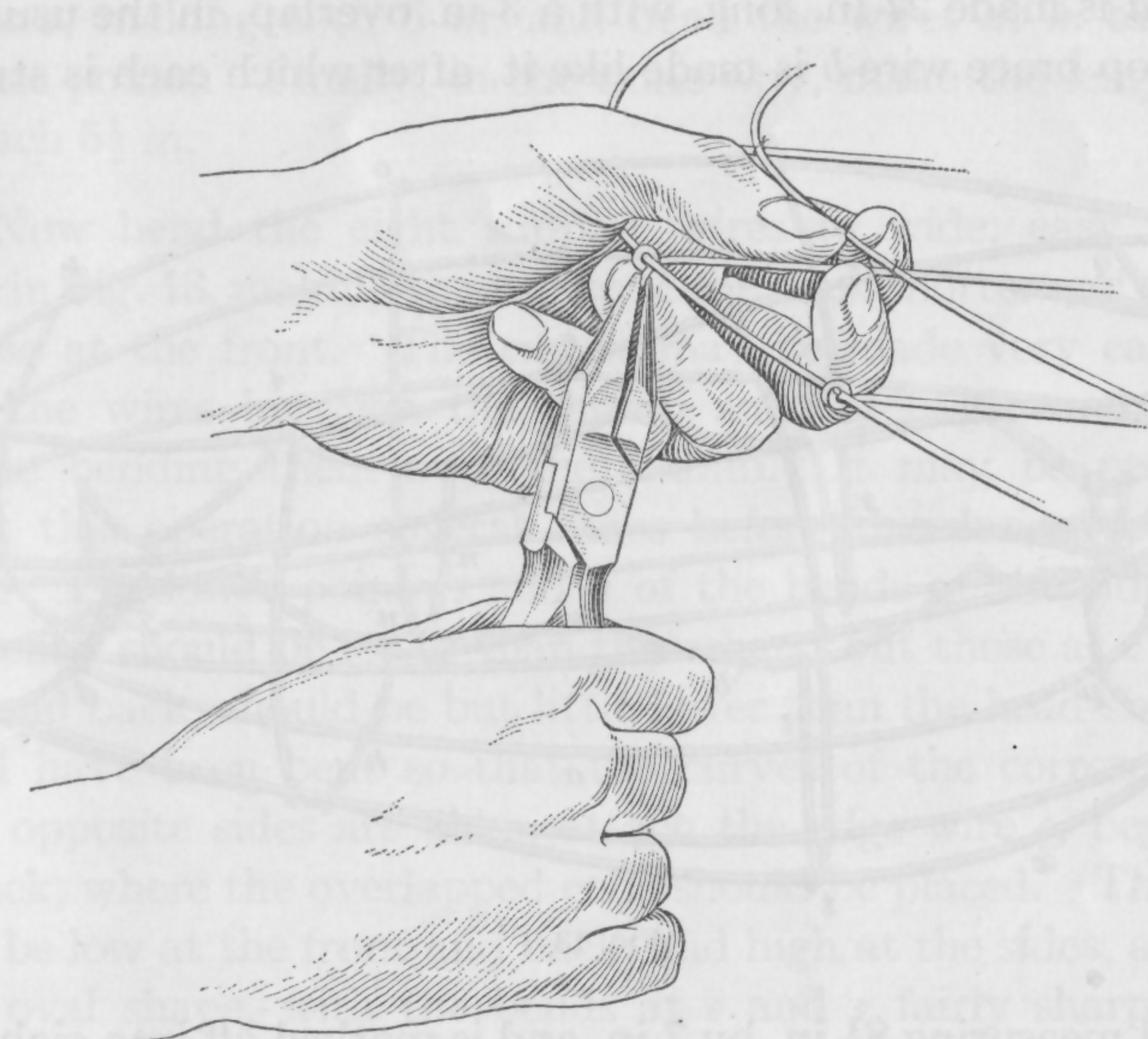


FIG. 12

ing operations, because the brace wire *l* will hold the support wires in position and keep them equally spaced. Care must be taken to have the overlap of the new edge wire come at the back of the brim, corresponding to the position of the overlap *m* of the brace wire *l*. By the time the refastening is completed, it will be found that there are several inches of edge wire that are not needed. This extra length should be cut off, after the overlap has been made. Finally, cut off the short ends of the support wires close to the edge wire *d* in its new position and press all the twists firmly with the pliers.



## TURBAN BRIM

20. The turban brim is shown completed in Fig. 13. It is oval in shape, that is, longer from front to back than from side to side, and the rolled effect of the brim is produced by bending the support wires in wide, smooth curves. To indicate the method of making this type of brim, directions will be given for the construction of one having a 24-in. head-size, and the lengths of the other wires will correspond to this head-size. For any other head-size, of course, the measurements will have to be changed somewhat. The head-size wire *a* is made 27 in. long, with a 3-in. overlap, in the usual way, and the top brace wire *b* is made like it, after which each is stretched

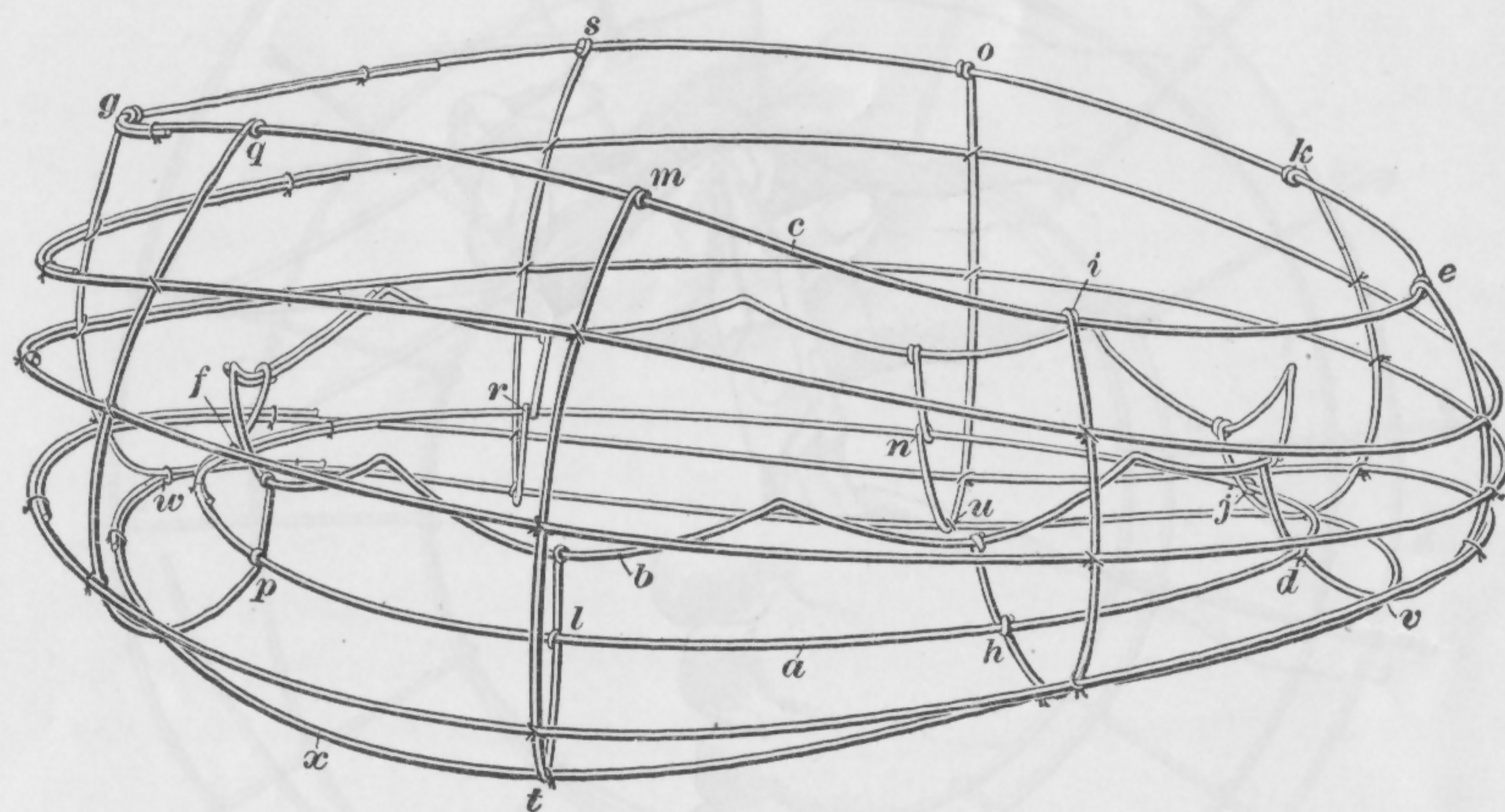


FIG. 13

to an oval measuring  $8\frac{1}{2}$  in. by 7 in. and is marked off into eight equal parts. The longest support wire measures  $6\frac{1}{2}$  in. from the brace wire *b* to the edge wire *c*, and if 2 in. is allowed at each end for twisting, the length required will be  $2+6\frac{1}{2}+2=10\frac{1}{2}$  in. To save time, cut the eight support wires at the same time, and each  $10\frac{1}{2}$  in. long. In the illustration the top brace wire *b* is shown bent up to sharp points between the places where the support wires are attached. This is done to shorten the wire and cause the brim to taper inwards from the head-size wire, and thus allow a tapered crown, such as a dome crown, to be set in place without any difficulty.

21. To make the turban brim, take the top brace wire *b*, Fig. 13, and attach the eight support wires at the equally spaced points.

The head-size wire *a* is to be  $\frac{1}{2}$  in. below the top brace wire; so take a paper gauge  $\frac{1}{2}$  in. long and measure off this length on each support wire below the brace wire *b*. Put on the head-size wire at these points by giving each support wire one complete turn around the head-size wire. The length of the support wire at the front, from *d* to *e*, is 4 in. Before bending this wire up, therefore, measure off 4 in. from the twist *d* and make a bend to locate the point *e*. The back support wire, from *f* to *g*, and the wires from *h* to *i* and *j* to *k* are also made 4 in. long and are measured off in the same way as *d e*. The side support wires are to be 6 in. long; so measure off the lengths *l m* and *n o*, making each 6 in. and bend the wires at *m* and *o* to mark these points. Finally, in the same way, make the lengths *p q* and *r s* each  $5\frac{1}{2}$  in.

22. Now bend the eight support wires to wide, easy curves, as shown in Fig. 13, making the curves at the back shorter and sharper than those at the front. The curves may be made very easily by drawing the wires between the thumb and forefinger and at the same time bending them over the thumb. It may be necessary to repeat this operation several times before the desired curve is obtained. The lower points *t* and *u* of the bends at the sides, just over the ears, should be lower than the others; but those at *v* and *w*, at front and back, should be but little lower than the head-size wire. When all have been bent so that the curves of the corresponding wires on opposite sides are alike, attach the edge wire *c*, beginning at the back, where the overlapped ends should be placed. This edge wire will be low at the front and back, and high at the sides, and will have an oval shape, with the bends at *e* and *g* fairly sharp. The length of the wire *c* will be 30 in., with a 4-in. overlap, making the oval measure 26 in. around. The brace wire *x* is tied to the support wires at the lowest points of the bends. The other three brace wires are not equally spaced, but are placed so as to preserve the outline of the brim. Nine yards of brace wire will be ample for the construction of this brim.

23. A completed turban, showing a dome crown set in place on the brim just described, is illustrated in Fig. 14. It must be borne in mind, however, that the brim and the crown are first covered with braid or other material before they are fastened together. The illustration is intended to show how the crown fits on the brim. The head-size wire *a* of the crown must fit down on the head-size wire *b*



of the brim with the overlaps at the same point. The reasons for bending the top brace wire *c* of the brim can now be readily understood. The dome crown begins to taper inwards above the head-size wire, and if the top brace wire *c* were left the same size and shape as the head-size wire *b*, it would not be possible to make the dome

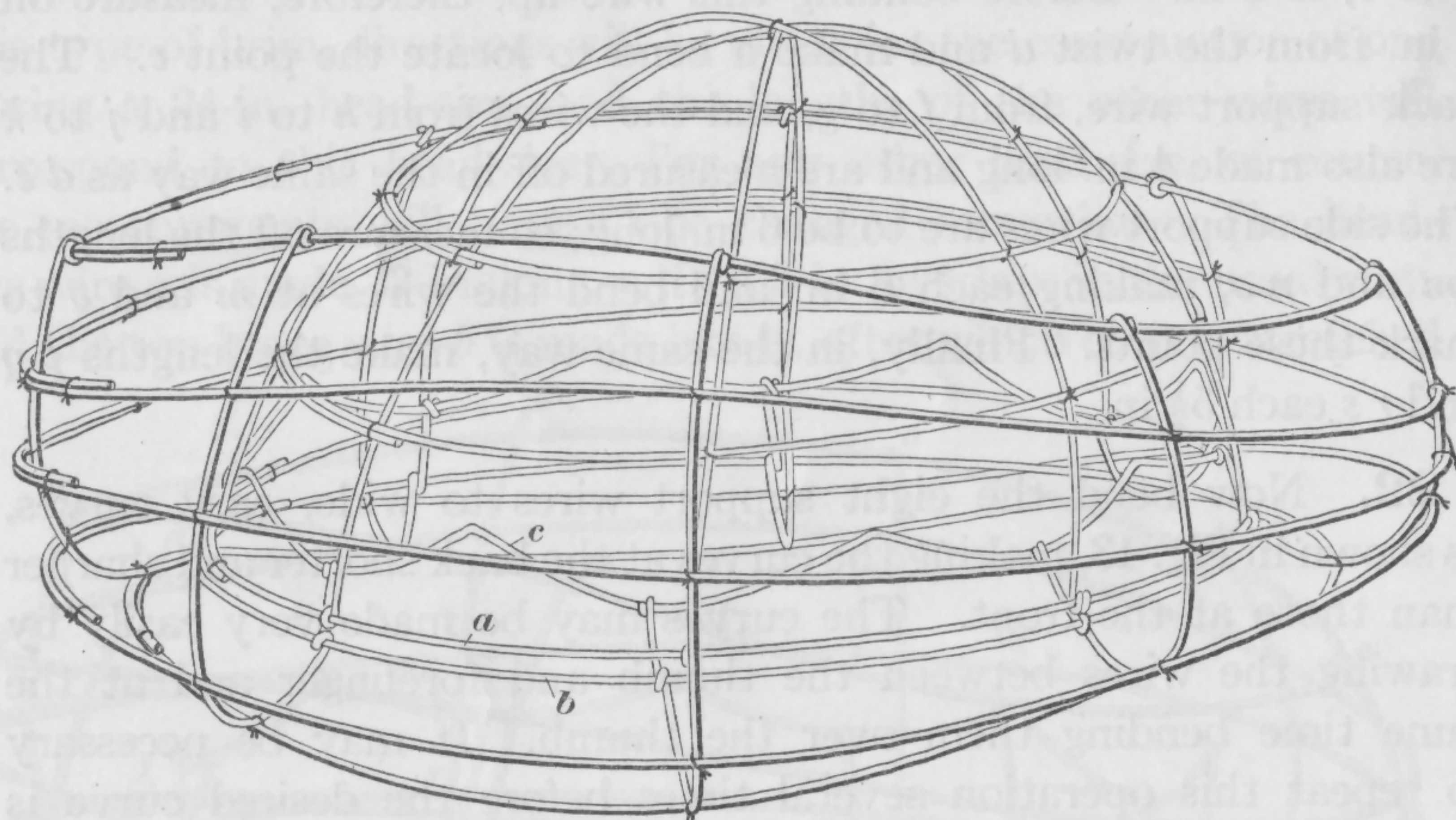


FIG. 14

crown fit down easily. However, by bending the wire *c* at the points shown, the brim is given a taper above the head-size wire *b* to correspond to that of the crown.

#### TOQUE BRIM

24. The form of frame shown in Fig. 15 is called a **toque brim**. The head-size wire *a* and the top brace wire *b* are of the same size and shape and are  $\frac{3}{4}$  in. apart. To them are fastened eight support wires, spaced equally. These wires are carried downwards and outwards below the head-size wire to a distance of  $1\frac{1}{4}$  in., where they are bent and turned upwards. They are made long enough so that their upper ends are from 1 in. to 3 in. above the head-size wire, and the edge wire *c* is fastened at the ends of the support wires. To make the brim higher at one side than at the other, the support wires are made longest at the points where the greatest height is desired. To outline the method of making a brim of this form, complete directions and actual measurements will be given; but it must be remembered that these dimensions will produce a frame of a certain size. If a different size is desired, or if it is desired to alter the height or

the curvature of the brim to suit different wearers or to bring out special ideas of the maker, other lengths of wires must be used.

25. The head-size wire *a*, Fig. 15, is 24 in. around and is made in exactly the same manner as the head-size wires of the brims already described. The top brace wire is made like it and each wire is then divided into eight equal parts for the attachment of the support wires. The longest support wire is that which is fastened to the top brace wire at *d* and to the edge wire at *e*. The length *df* is  $\frac{3}{4}$  in., the length *fg* is  $1\frac{1}{4}$  in., and the height *ge* is  $4\frac{1}{2}$  in. If 2 in. is allowed at each end of the wire to allow it to be twisted readily around the top brace wire and the edge wire, the length of this longest support wire will be  $2 + \frac{3}{4} + 1\frac{1}{4} + 4\frac{1}{2} + 2 = 10\frac{1}{2}$  in. As wire is inexpensive, the eight support wires may as well be cut at the same time, and

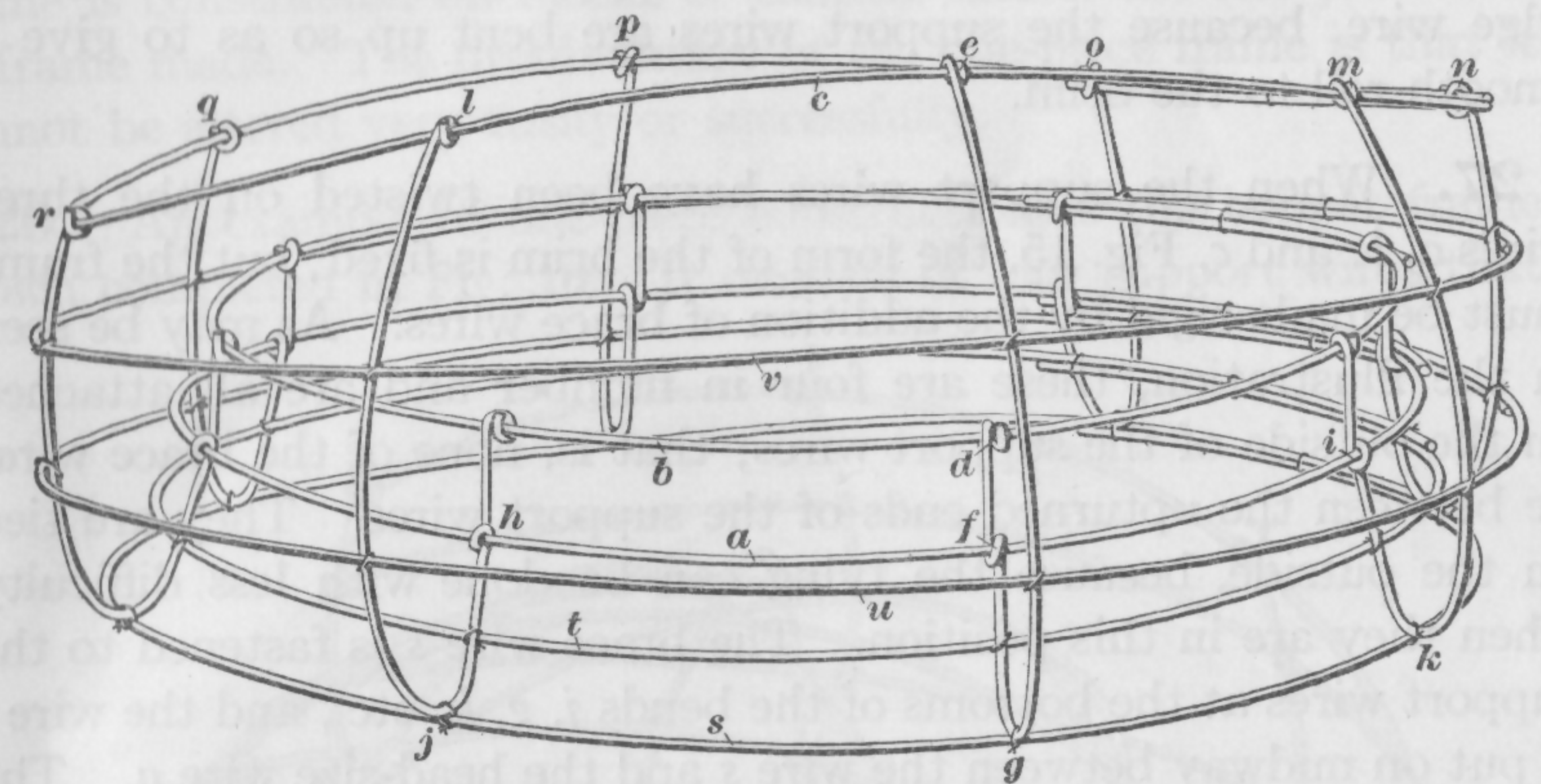


FIG. 15

each made  $10\frac{1}{2}$  in. long. Fasten these to the top brace wire *b* at the eight points marked, cut them off close and press the twists firmly. Measure off a length of  $\frac{3}{4}$  in. from the top brace wire along each support wire to locate the points where the head-size wire is to be attached, and twist each support wire once around the head-size wire. Be sure to have the overlapped ends of the head-size wire beneath those of the top brace wire.

26. After the head-size wire is fastened, let the support wires extend straight downwards. Take a paper gauge  $1\frac{1}{4}$  in. long and from the points *f*, *h*, *i*, etc., mark off lengths from the head-size wire downwards, locating the points *g*, *j*, *k*, etc., at which the support wires are to be bent upwards. The sharpness of these bends cannot



be definitely stated because it should be varied according to the features of the wearer. If the toque is for a woman with a narrow, long face, the bends at *g*, *j*, *k*, etc., should be rather sharp, so that the brim will lie close to the head; but if the face is round and full, the bends should be less sharp and the brim should stand out farther from the head. Bend the support wires upwards and curve each inwards, giving more roll to the longer wires *g e*, *j l*, and *k m* than to those on the opposite side. The lengths *j l* and *k m* are made 4 in. each, and the length *g e* is made  $4\frac{1}{2}$  in. The remaining five support wires are made  $2\frac{1}{2}$  in. in length from the bends to the points *n*, *o*, *p*, *q*, and *r*, and marks are made at these points. Then the edge wire *c*, which measures 26 in. around and has a 3-in. overlap, is fastened at the points thus marked, the ends are cut off, and the twists pressed down. The points *m*, *n*, *o*, *p*, etc., are not equally spaced along the edge wire, because the support wires are bent up so as to give a smooth roll to the brim.

27. When the support wires have been twisted on the three wires *a*, *b*, and *c*, Fig. 15, the form of the brim is fixed; but the frame must be made rigid by the addition of brace wires. As may be seen in the illustration, these are four in number and are all attached on the outside of the support wires; that is, none of the brace wires lie between the upturned ends of the support wires. They are tied on the outside, because the tying can be done with less difficulty when they are in this position. The brace wire *s* is fastened to the support wires at the bottoms of the bends *j*, *g*, *k*, etc., and the wire *t* is put on midway between the wire *s* and the head-size wire *a*. The wires *u* and *v* are so located that the part of each support wire from the bend to the edge wire is divided into three nearly equal parts. The divisions need not be exactly equal; the main point is to locate the brace wires so as to stiffen the frame to the best advantage and at the same time maintain the general shape. Care must be taken to put all the overlaps of these brace wires at the back of the brim. A toque brim of the dimensions given can be made with less than 9 yd. of wire.

## ONE-PIECE FRAMES

### BONNET FRAME

28. The preceding descriptions of the construction of crowns and brims have outlined the methods to be followed in making these parts of the frame separately; but it is possible to make the crown and the brim in one piece, thus producing what is called a one-piece frame, to distinguish it from the two-piece frame made by combining a crown and a brim that have been made separately. The two-piece frame is the easier to construct and handle; on the other hand, the one-piece frame made particularly to fit the wearer represents the highest type of the frame-maker's art. The factory-made one-piece frame is constructed on blocks or shapers and is the cheapest kind of frame made. The disadvantage of the one-piece frame is that it cannot be altered very easily or successfully.

29. An example of one-piece construction is the bonnet frame shown completed in Fig. 16. It consists of four support wires that

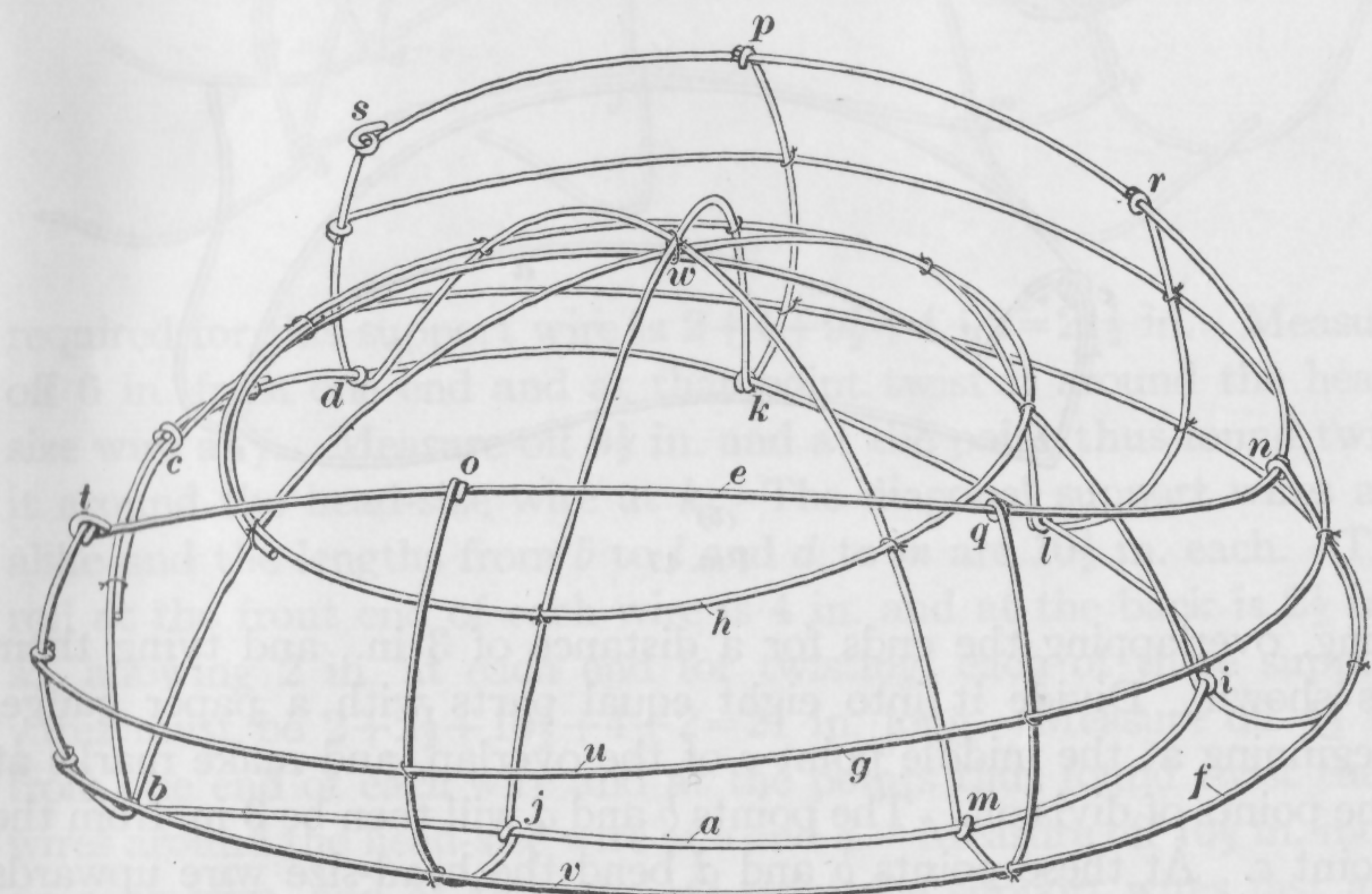


FIG. 16

form a dome-shaped crown and are fastened to a head-size wire *a*. The head-size wire is not a regular oval, as in most of the preceding constructions, but is bent sharply upwards at the back, as shown by



the arch  $bcd$ . This bonnet frame is of the type largely worn by elderly women, who coil the hair into a knot at the back of the head. The arching of the head-size wire at the back, therefore, allows the frame to rest well on the top of the head without pressing on the coil of hair. The support wires are twisted once around the head-size wire and their ends are then bent outwards and upwards to form a rolling brim, at the top of which the edge wire  $e$  is fastened. The brim is stiffened by the addition of the two brace wires  $f$  and  $g$ , and the crown by the single brace wire  $h$ .

**30.** The beginning of the bonnet frame is shown in Fig. 17 (a). Make a 24-in. head-size wire  $a$  by taking a piece of brace wire 27 in.

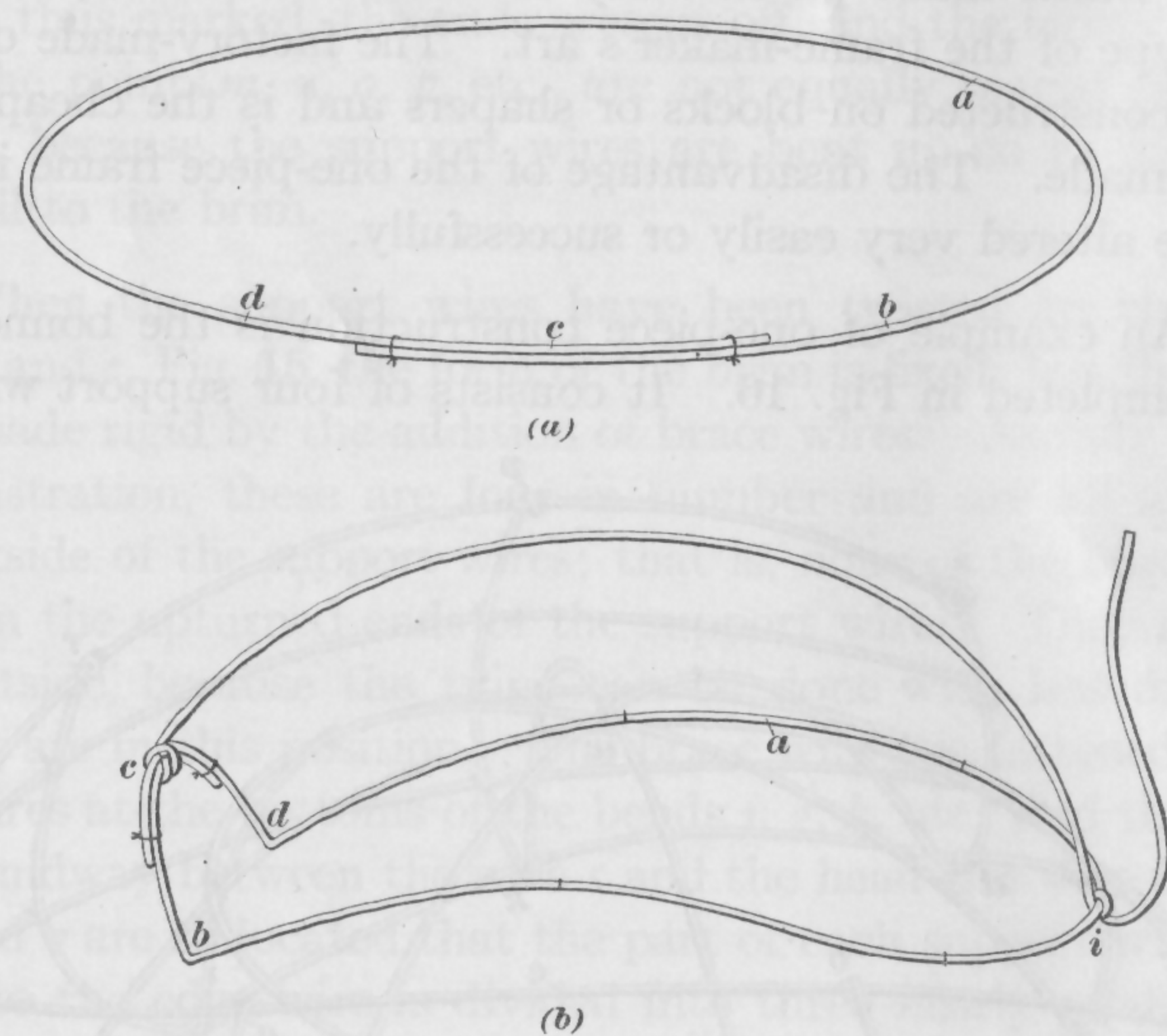


FIG. 17

long, overlapping the ends for a distance of 3 in., and tying them as shown. Divide it into eight equal parts with a paper gauge, beginning at the middle point  $c$  of the overlap, and make marks at the points of division. The points  $b$  and  $d$  will then be 3 in. from the point  $c$ . At these points  $b$  and  $d$  bend the head-size wire upwards and forwards, as shown in (b), thus forming the arch. This illustration, as well as those that show the later stages of the construction, are lettered the same as the corresponding parts in the finished frame, Fig. 16, and so the steps in the construction may easily be followed in the illustration of the completed frame, as well. The parts of the

head-size wire that extend from the points  $b$  and  $d$ , Fig. 17 (b), to the front of the bonnet at  $i$  should be curved upwards, as shown.

**31.** After the head-size wire has been bent to shape as in Fig. 17, the support wires should be fastened to it, as shown in Fig. 18. Put on the support wire from back to front first. The length from  $c$  to  $i$  is  $9\frac{1}{2}$  in., and another  $6\frac{1}{2}$  in. should be allowed for the roll of the brim and for twisting around the edge wire. Therefore, take a piece of brace wire  $9\frac{1}{2} + 6\frac{1}{2} = 16$  in. long, twist one end around the head-size wire  $c$ , then measure off  $9\frac{1}{2}$  in. from the point  $c$  and at that point twist the support wire around the head-size wire at the front mark  $i$ . The side-to-side support wire is next put on. It has a length of  $9\frac{1}{2}$  in. from  $j$  to  $k$ , and the roll at each end requires 4 in. To this must be added 2 in. at each end for twisting; consequently, the length of wire

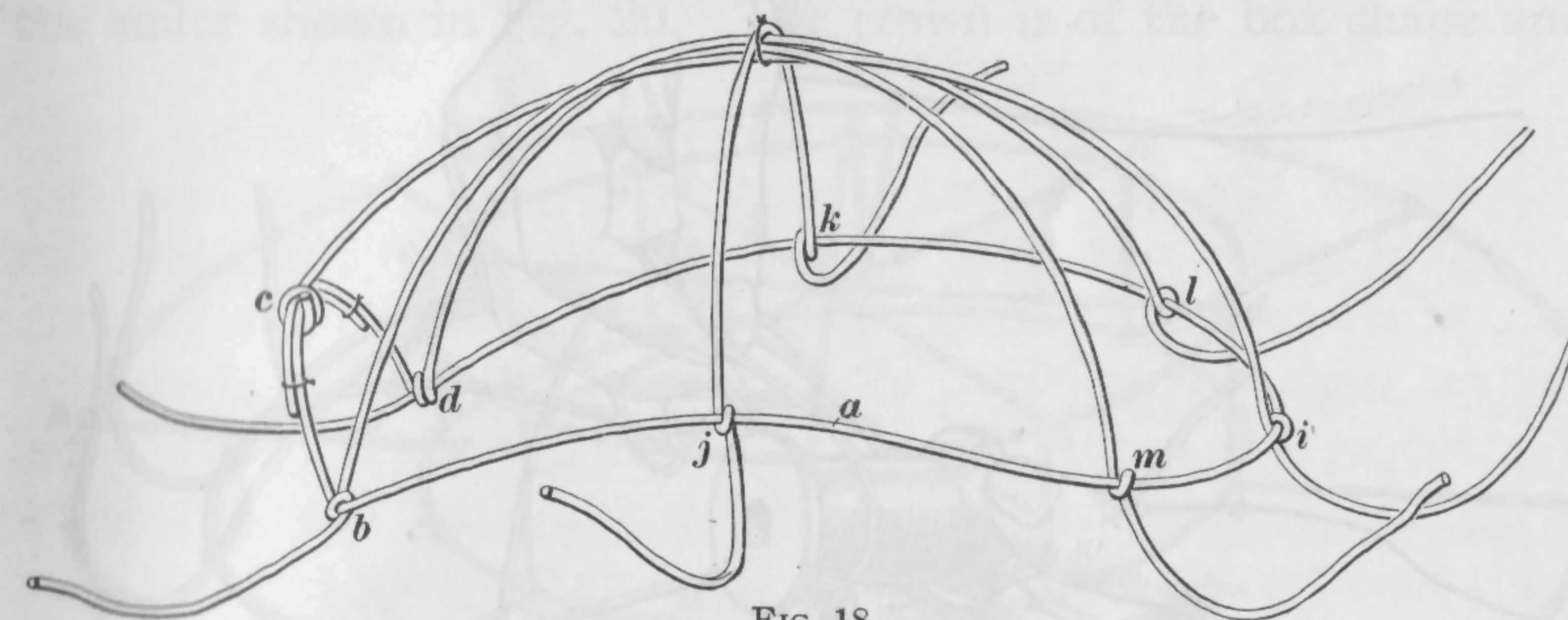


FIG. 18

required for this support wire is  $2 + 4 + 9\frac{1}{2} + 4 + 2 = 21\frac{1}{2}$  in. Measure off 6 in. from one end and at that point twist it around the head-size wire at  $j$ . Measure off  $9\frac{1}{2}$  in. and at the point thus found twist it around the head-size wire at  $k$ . The diagonal support wires are alike and the lengths from  $b$  to  $l$  and  $d$  to  $m$  are  $10\frac{1}{2}$  in. each. The roll at the front end of each wire is 4 in. and at the back is  $2\frac{1}{2}$  in.; so, allowing 2 in. at each end for twisting, each of these support wires must be  $2 + 2\frac{1}{2} + 10\frac{1}{2} + 4 + 2 = 21$  in. long. Measure off  $4\frac{1}{2}$  in. from one end of each wire and at the points thus found twist these wires around the head-size wire at  $b$  and  $d$ . Measure off  $10\frac{1}{2}$  in. more on each wire, and at these points twist the support wires fast at  $l$  and  $m$ . Then tie the support wires together where they cross at the top of the crown. The frame at this stage will appear as in Fig. 18.

**32.** The next step in the construction of the bonnet frame is to bend the ends of the support wires so as to form the roll of the brim.



A simple method of doing this is shown in Fig. 19. Take a spool of thread from which about half of the thread has been used, and bend the ends of the support wires up around it, as shown. These curves will probably be too small, but it is a simple matter to open them out. Next, lay off the lengths of the ends of the support wires, measured from the head-size wire to the edge wire. At the front, Fig. 16, mark the point *n* by a bend or with a pencil, at a distance of  $3\frac{1}{2}$  in. from *i*; on the side-to-side wire mark the points *o* and *p* so that *j o* and *k p* measure 4 in. each; then mark the points *q* and *r*, making *m q* and *l r*  $3\frac{3}{4}$  in. each; and finally make *d s* and *b t* each  $2\frac{1}{2}$  in. and mark the points *s* and *t*. Now fasten the edge wire *e*

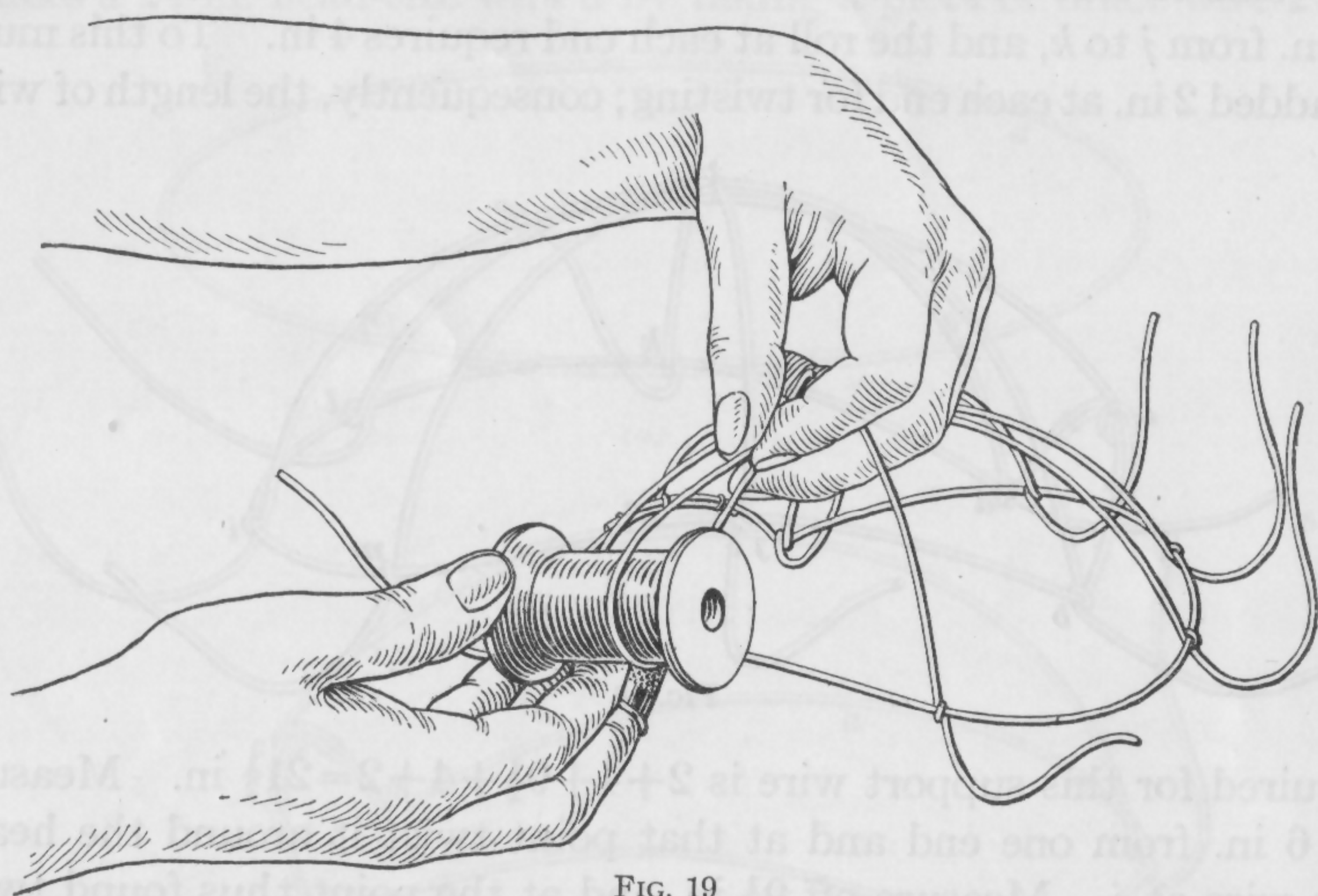


FIG. 19

by twisting the support wires around it at the points *s*, *p*, *r*, *n*, etc., that have been marked on the support wires, cut the support wires off close, and press down the twists. To prevent the edge wire from pulling out, its ends should be looped back over the twists at *s* and *t* and pressed down firmly. It should be noted that the ends *b t* and *d s* curve up sharply at *b* and *d* and lie rather close to the crown. The wire *s t* is  $20\frac{1}{2}$  in. long, including allowance for twists.

**33.** The next step in the construction of the bonnet frame is to add the brace wire to the brim and crown. Each of the brace wires *u* and *v*, Fig. 16, is  $22\frac{1}{2}$  in. long, not including the amounts required at the ends to make the twists. They should be fastened to the support wires with tie wires and spaced at about equal

distances from each other and from the edge wire and the head-size wire. The brace wire *h* is put around the crown about midway between the top *w* and the head-size wire, with the overlapped ends at the back, just above the arch *b c d*. The wires *u* and *v* are fastened on the outside of the brim, as shown, and the wire *h* is on the outside of the crown. It is very important to bend the ends of the support wires to the desired shape of the bonnet before attaching the edge wire and the brace wires; for after these wires are fastened, the frame is stiffened so that only the slightest changes of shape are possible. This frame can be made with 4 yd. of wire.

## PLAIN SAILOR

**34.** Another example of one-piece construction is the frame of the sailor shown in Fig. 20. The crown is of the box shape and is

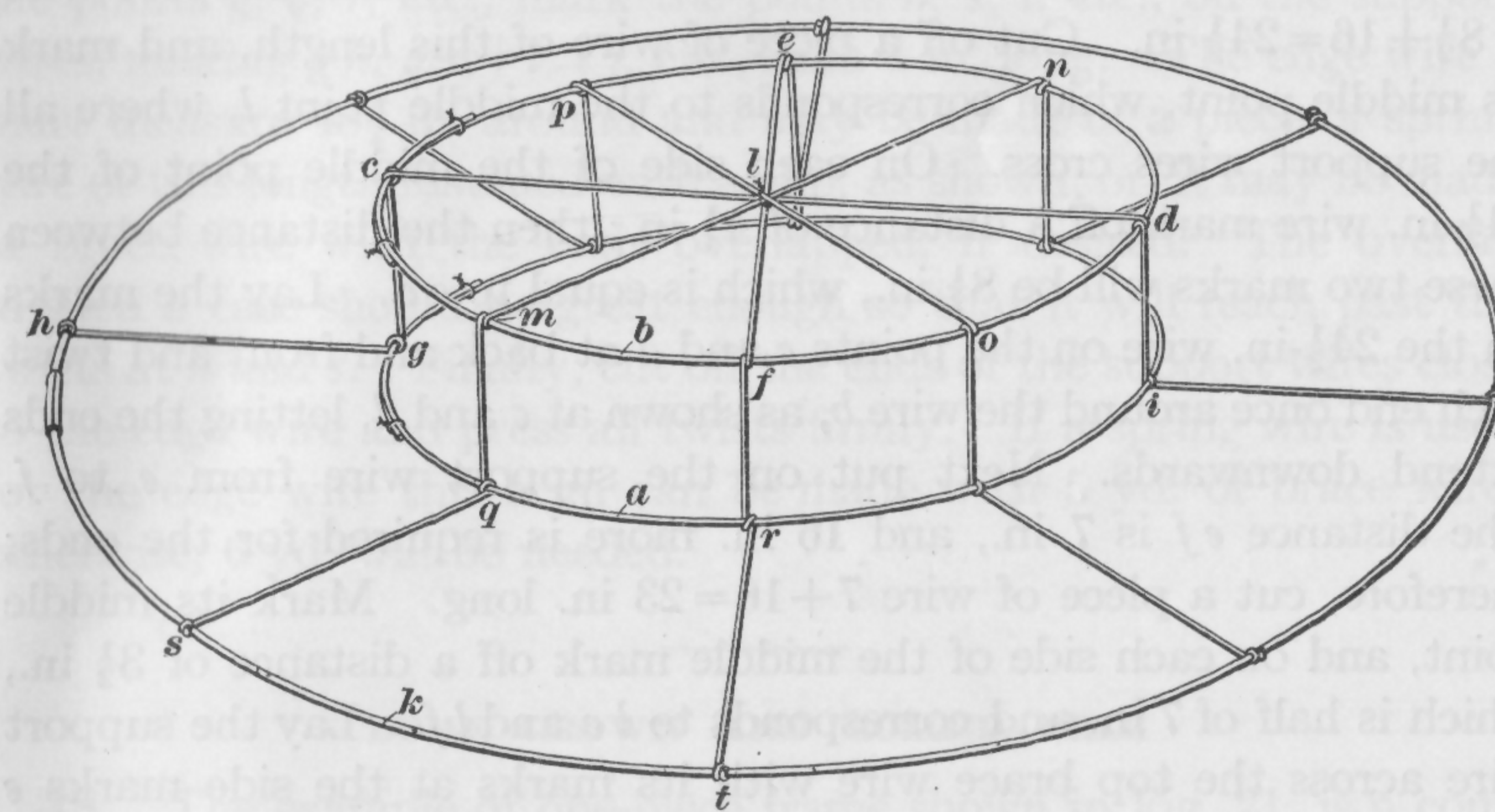


FIG. 20

2 in. high and the brim has a width of 4 in. all around. These dimensions, of course, can be altered if desired; but for the purpose of illustration, this frame will be assumed to have the sizes stated and the lengths of the various wires will be based on those sizes. The head-size wire *a* is made first, and is 24 in. around. Make the top brace wire *b* of the same size as the head-size wire, and then stretch both of them to an oval shape measuring  $8\frac{1}{2}$  in. long by 7 in. wide. By means of a paper gauge, mark off each into eight equal divisions, beginning at the middle point of the overlap on each. The support wire from *c* to *d* is the longest, that from *e* to *f* is the shortest,



and the remaining two are alike. Each support wire is a single piece extending from the edge wire at one side to the edge wire at the opposite side. The height of the crown and the width of the brim are the same all around, and their sum is  $2+4=6$  in., which is the length of wire required to make one end, as  $c g$  and  $g h$ . The parts  $d i$  and  $i j$  are the same, and take 6 in. more. Then, 2 in. must be allowed at each end for twisting, or 4 in. for both ends. Therefore, the length of wire required for twisting and for making the parts of each support wire between the top brace wire  $b$  and the edge wire  $k$  is  $12+4=16$  in. To get the total length required for each wire, this 16 in. must be added to the length required across the top of the crown.

**35.** The length  $c d$ , Fig. 20, is  $8\frac{1}{2}$  in., and the ends require 16 in. more, according to the calculations given in the preceding article; hence, the total length required for the front-to-back support wire is  $8\frac{1}{2}+16=24\frac{1}{2}$  in. Cut off a piece of wire of this length, and mark its middle point, which corresponds to the middle point  $l$ , where all the support wires cross. On each side of the middle point of the  $24\frac{1}{2}$ -in. wire mark off a distance of  $4\frac{1}{4}$  in.; then the distance between these two marks will be  $8\frac{1}{2}$  in., which is equal to  $c d$ . Lay the marks on the  $24\frac{1}{2}$ -in. wire on the points  $c$  and  $d$  at back and front and twist each end once around the wire  $b$ , as shown at  $c$  and  $d$ , letting the ends extend downwards. Next put on the support wire from  $e$  to  $f$ . The distance  $e f$  is 7 in., and 16 in. more is required for the ends; therefore, cut a piece of wire  $7+16=23$  in. long. Mark its middle point, and on each side of the middle mark off a distance of  $3\frac{1}{2}$  in., which is half of 7 in. and corresponds to  $l e$  and  $l f$ . Lay the support wire across the top brace wire with its marks at the side marks  $e$  and  $f$  on the top brace wire and twist each end of the support wire once around the brace wire, as shown.

**36.** The length  $m n$ , Fig. 20, of the diagonal support wire is  $7\frac{3}{4}$  in., and 16 in. is needed for the ends, so that its total length must be  $23\frac{3}{4}$  in., or almost 24 in., and the other diagonal support wire is the same. So cut off two lengths of wire, each 24 in. long, and mark the middle of each. Now lay one of these 24-in. wires across the top brace wire from  $m$  to  $n$  with the middle point of the support wire at  $l$ , and twist each end once around the top brace wire. Care should be taken not to bend the top brace wire out of its oval shape when making these twists. Lay the other 24-in. wire across from  $o$  to  $p$

and fasten it in the same manner. The distances  $m n$  and  $o p$  will be  $7\frac{3}{4}$  in. each if the work is accurately done. Tie all the support wires together at the point  $l$  where they cross, this being the middle point of the top of the crown.

**37.** Now take the tape measure, or a paper gauge of correct length, and from the twists  $c, m, f, o$ , etc., Fig. 20, mark off a length of 2 in. downwards on each support wire, thus locating the points  $g, q, r$ , etc., at which the head-size wire must be attached to produce a crown 2 in. high. Bend the support wires upwards and outwards at these points. Then set the head-size wire  $a$  into the bends, with the overlap at the back, and twist the support wires around the head-size wire at the eight equally spaced points  $g, q, r$ , etc., giving one full turn to each. Next mark off the width of the brim on the support wires. Use a paper gauge 4 in. long, or a tape measure, and from the points  $g, q, r$ , etc., mark the points  $h, s, t$ , etc., on the support wires, making  $g h, q s, r t, i j$ , etc., each 4 in. long. The edge wire  $k$  must measure  $48\frac{1}{2}$  in. around and may be made of a piece of spring wire of this length fastened with a clip, as shown; or, it may be made of brace wire with the ends overlapped, if desired. The overlap in such a case should be great enough so that it will reach past the twists at  $h$  and  $s$ . Finally, cut off the ends of the support wires close to the edge wire and press all twists firmly. If a spring wire is used for the edge wire this brim can be made with 5 yd. of brace wire; otherwise, 6 yd. will be needed.

#### DOMES CROWN AND ROLLED BRIM

**38.** The example of one-piece frame shown in Fig. 21, is a combination of a dome crown with a rolled brim. In this frame the opposite halves, taken in any direction, are not alike. The lengths and the curves of the support wires must be determined largely by the judgment of the maker, who must decide what proportions will give the best appearance; for the same width and roll of brim will not look equally well on all wearers. However, to serve as a guide, the approximate measurements of a frame like that shown will be given.

**39.** Make the head-size wire  $a$ , Fig. 21, in the usual way, 24 in. around, and mark it off into eight equal parts, beginning at the point  $b$ , at the middle of the overlap. The length from  $b$  to  $c$  over



the dome is 12 in., the width of the brim  $bd$  is 3 in., and at the front it is the same. Allowing 2 in. at each end for twisting, the front-to-back support wire must have a length of  $2+3+12+3+2=22$  in. Cut off a 22-in. length of brace wire and bend up 5 in. at each end. Set these bends at the points  $b$  and  $c$  of the head-size wire, and twist the ends of the support wire once around the wire  $a$  at these points. The side-to-side support wire measures 10 in. from  $e$  to  $f$  over the dome; but at the left side the brim is 6 in. wide, whereas at the right side it is only  $2\frac{1}{2}$  in. wide. Allowing 2 in. at each end for twisting, the length of the side-to-side support wire is  $2+6+10+2\frac{1}{2}+2=22\frac{1}{2}$  in. Cut a piece of this length, turn up 8 in. at one end and  $4\frac{1}{2}$  in. at the

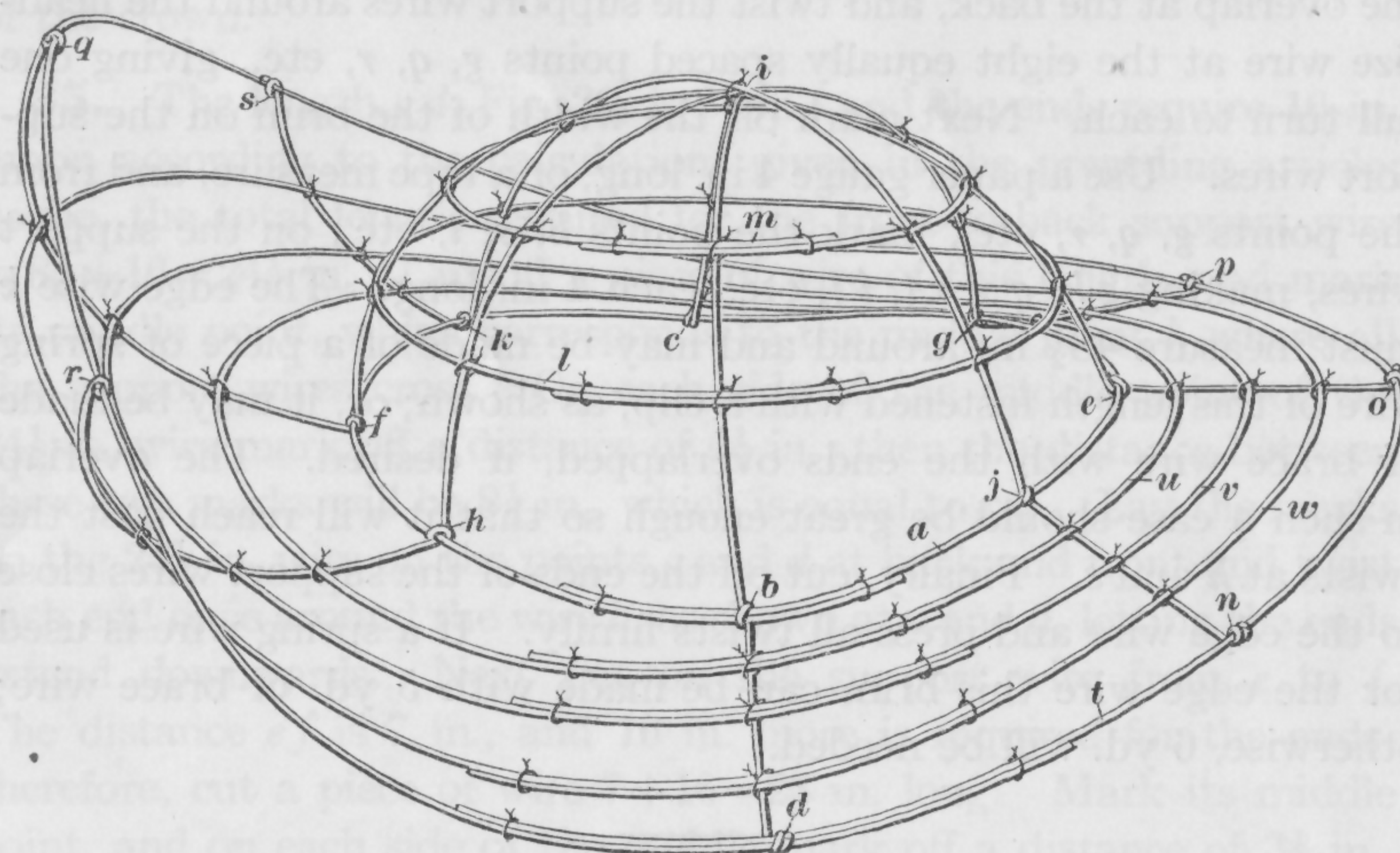


FIG. 21

other, set it across from  $e$  to  $f$ , with the short end to the right, and make the twists at  $e$  and  $f$ .

40. The diagonal support wires are put on next. Take a piece of brace wire 22 in. long, bend up  $4\frac{1}{2}$  in. at one end, and set this bend against the inside of the head-size wire at  $g$ , Fig. 21. Twist the end of the support wire once around the head-size wire at  $g$ . Then carry it across the top of the dome to the point  $h$ , and make a twist there. This support wire should rest against the other two support wires at the point  $i$  where they cross, and should measure  $10\frac{1}{2}$  in. from  $g$  to  $h$ . The other diagonal support wire, from  $j$  to  $k$ , is made of the same length as the first, bent like it, and attached in the same way. Then all the support wires are tied together with tie wire at the

middle point  $i$ . Complete the dome crown by adding the two brace wires  $l$  and  $m$ , spacing them about equally between the head-size wire and the point  $i$ .

41. The width of the brim must now be marked off on the support wires, Fig. 21. It varies at different points. The widths  $j n$ ,  $e o$ , and  $g p$  are made  $2\frac{1}{2}$  in. each. At the back and the front the width is made 3 in. The roll from  $f$  to  $q$  is made 6 in.; from  $h$  to  $r$ , 5 in.; and from  $k$  to  $s$ , 4 in. The points  $n$ ,  $o$ ,  $p$ ,  $q$ ,  $r$ , etc., are marked either with a pencil or by making bends in the wire. The parts of the support wires at the left must now be curved, to produce the roll of the brim. This can best be done in connection with the operation of attaching the edge wire  $t$ , as there will then be something to hold the support wires after they are bent. Take a piece of brace wire 51 in. long and twist the support wires around it at the points  $n$ ,  $o$ ,  $p$ , etc., that have been marked on the support wires. Leave an end to the left of the twist  $n$  long enough to form the overlap. Before making the twists at  $s$ ,  $q$ , and  $r$ , bend the support wires to the height and curve desired for the brim; then bring the end of the edge wire down from  $r$ , make the twist at  $d$ , and tie the overlapped ends, as shown.

42. All that remains to be done to complete the frame in Fig. 21 is to attach the brace wires  $u$ ,  $v$ , and  $w$ . The method of fastening them to the support wires is exactly the same as that described previously in connection with the making of brims of others shapes. The brace wires are fastened on top of the support wires, and from the back to the front, along the right side of the frame, they are spaced equally, as shown. The spacing may be done by eye, after some experience has been gained; otherwise, the support wires should be marked at the points where the brace wires are to be attached. At the left side, on the roll of the brim, the brace wires are not quite equally spaced, but are located so as to maintain the general curve of the rolled part. The overlaps of the ends must be put at the back, as in the case of the head-size and edge wires. Nine yards of wire will be required for this frame.



# SKELETON FOUNDATIONS

(PART 2)

## EXAMINATION QUESTIONS

- ✓ (1) If the brim of a frame has a head-size too large, how may it be reduced?
- ✓ (2) Why should the ends of the support wires of a bonnet frame be bent to the desired shape before the edge wire and the brace wires are attached?
- ✓ (3) What objects does the brim of a hat fulfil?
- ✓ (4) When reducing the width of a brim, how are the twists of the support wires loosened from the edge wire?
  - (5) What two methods may be used in measuring off the width of a brim on the support wires?
  - (6) Explain how a brim that is too wide can be reduced in width.
- ✓ (7) What is the first step in the construction of a brim?
- ✓ (8) If a support wire is made too long, thus making the brim a trifle wide, how can it be shortened easily?
- ✓ (9) What is the difference between the poke brim and the mushroom droop?
  - (10) Under what conditions will it be necessary to put in brace wires between the head-size wire and the edge wire of a sailor brim?
- ✓ (11) What is meant by the edge wire of a brim?
- ✓ (12) Why is the head-size wire of a bonnet frame bent upwards into an arch at the back?



- (13) What must be done to the top brace wire of a brim if a crown having a taper, such as a dome crown, is to be used with the brim?
- (14) Explain how a twist that has been made at a slightly incorrect point may be shifted readily.
- (15) What two other styles of brim may be made by bending the support wires of a mushroom droop?
- (16) How would you find the total length of wire to use for a support wire when making a one-piece sailor frame?
- (17) What is the disadvantage of the one-piece frame?
- (18) What is the effect of shortening the edge wire of a sailor brim?
- (19) What is the advantage of the two-piece frame?
- (20) In the construction of a toque brim, why should the brace wires be attached on the outside of the support wires?